United States
Department of
Agriculture

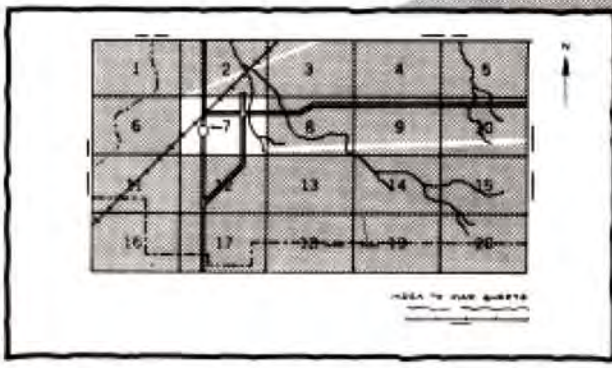
Soil
Conservation
Service

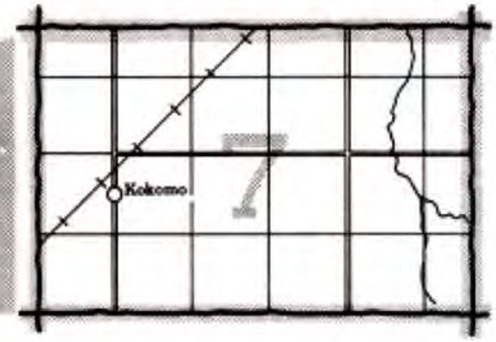
In cooperation with the
University of Nebraska
Conservation and
Survey Division

Soil survey of Custer County Nebraska

HOW TO USE

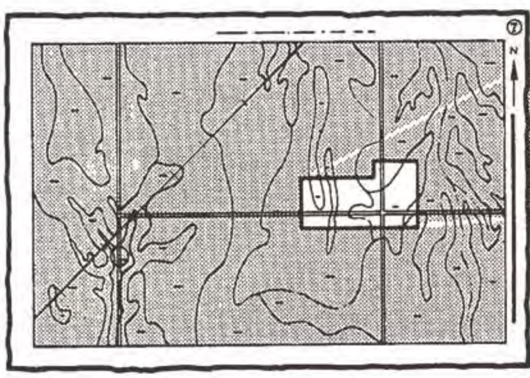
1. Locate your area of interest on the "Index to Map Sheets"

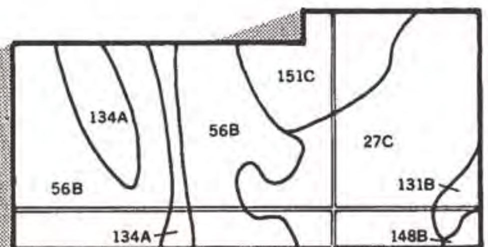




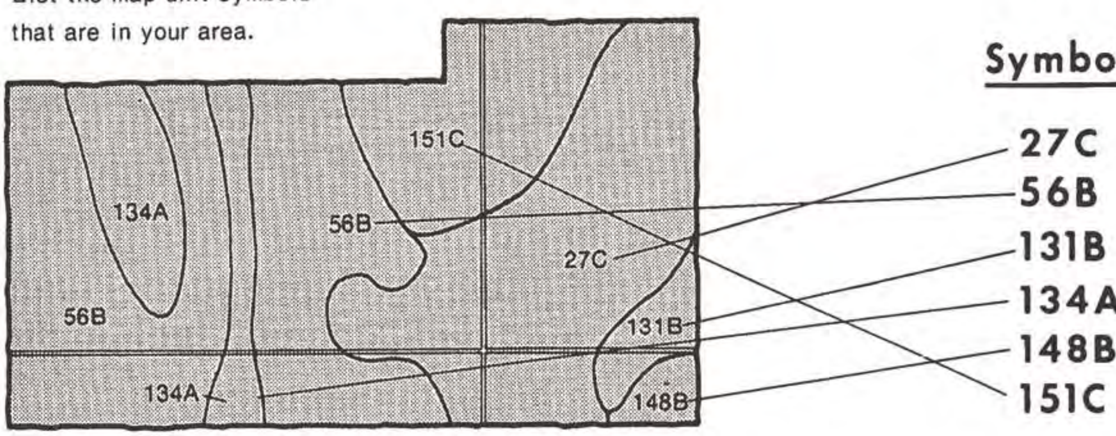
2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.



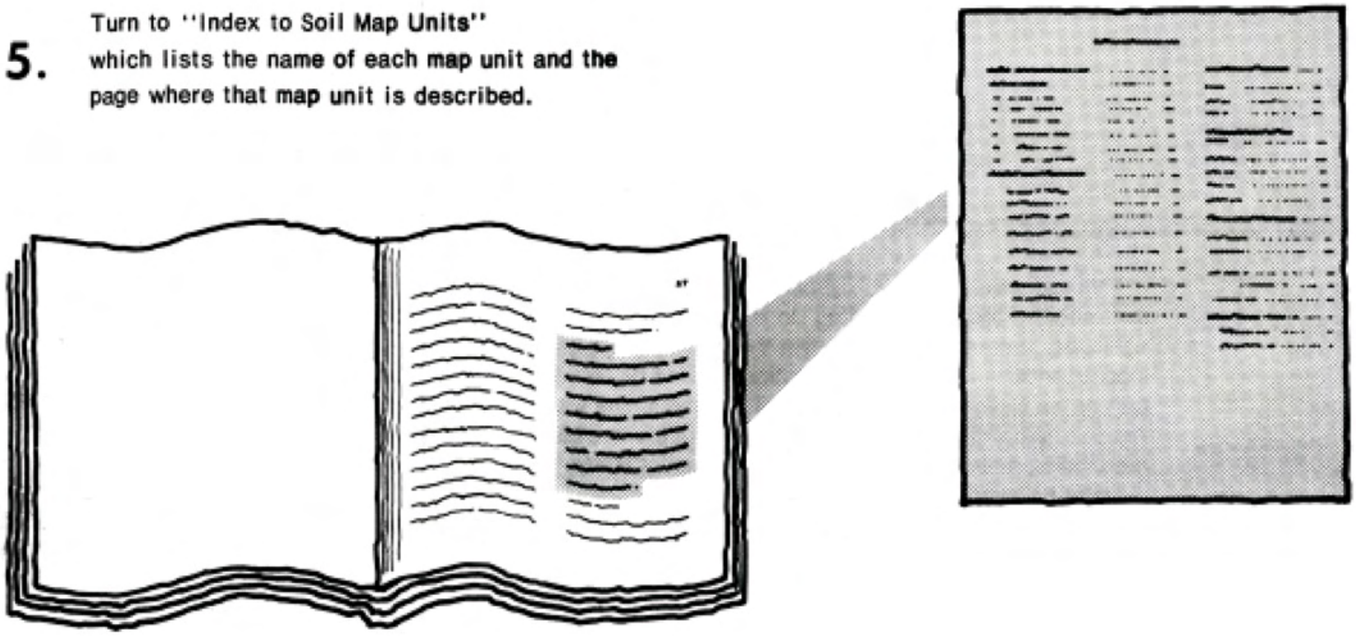


4. List the map unit symbols that are in your area.

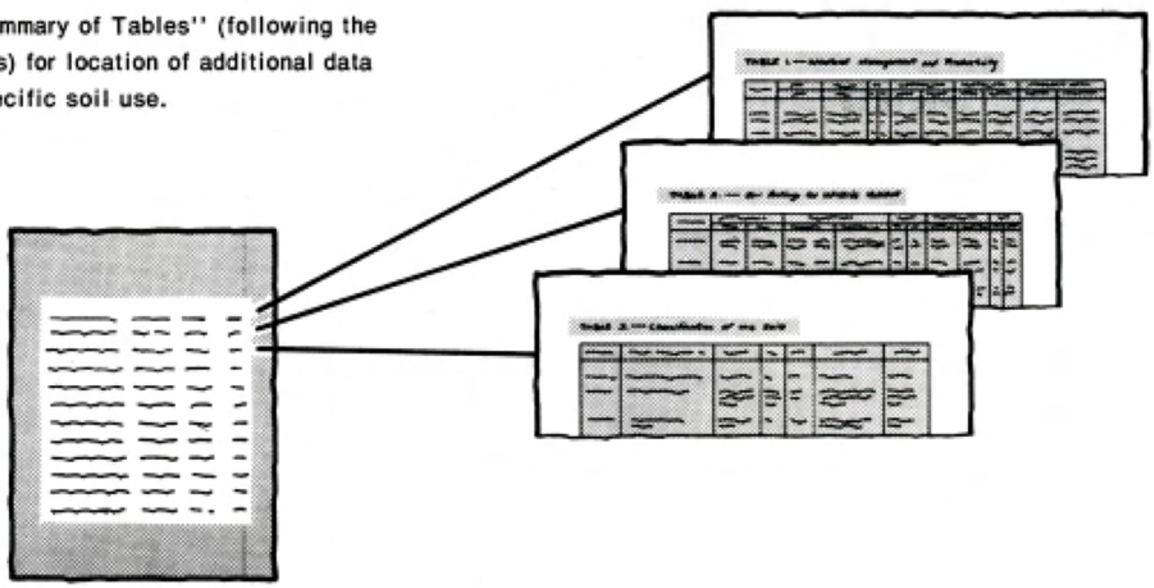


THIS SOIL SURVEY

5. Turn to ''Index to Soil Map Units'' which lists the name of each map unit and the page where that map unit is described.



6. See ''Summary of Tables'' (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; to specialists in wildlife management, waste disposal, or pollution control.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

This survey was made cooperatively by the Soil Conservation Service and the University of Nebraska Conservation and Survey Division. It is part of the technical assistance furnished to the Lower Loup Natural Resource District, which provided financial assistance towards the completion of this survey. Major fieldwork for this soil survey was performed in the period 1967-1979. Soil names and descriptions were approved in 1979. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1979.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: Sprinkler irrigation of corn, feedlot windbreak, and terraces and contour plowing in an area of the Holdrege-Hall-Hord association in Custer County.

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Issued July 1982

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foreword

This soil survey contains information that can be used in land use planning in Custer County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.

A. E. Sullivan
State Conservationist
Soil Conservation Service

soil survey of
Custer County, Nebraska

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United States Department of Agriculture
Soil Conservation Service
in cooperation with the
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Custer County is in central Nebraska (fig. 1). It is the second largest county in the state. The total land area is 2,556 square miles, or 1,636,864 acres. Water covers another 2,816 acres.

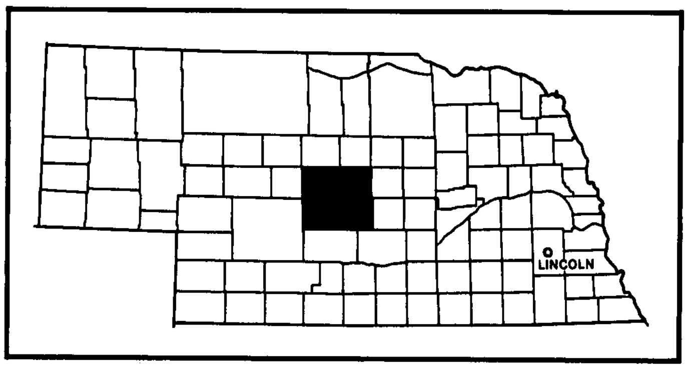

Figure 1.—Location of Custer County in Nebraska.

The county was first organized in 1877, just eight years after the first cattlemen moved into the area. Homesteaders began entering the area in 1873, and by 1890 most of the land was settled. Early settlers located along the larger streams, but gradually the uplands were homesteaded and cattle operations expanded to these areas.

In 1980, Custer County had a population of 13,872. Broken Bow, the county seat and largest town, had a population of 3,974. It is the major trade center for the county. The other incorporated towns are Anselmo, Ansley, Arnold, Berwyn, Calloway, Comstock, Mason City, Merna, Milburn, Oconto, Sargent, Weissert, and Westerville. All towns are served by paved highways, and most are served by railroads.

The economy of Custer County centers around agriculture and related enterprises. Combination grain-livestock operations dominate. Beef cattle are the major type of livestock. The major crops are corn, grain sorghum, wheat, and alfalfa. Much of the grain and hay is fed to livestock on the farm. The expansion of irrigation, especially center-pivot irrigation, has greatly increased farm production in the county.

The soils in Custer County differ widely in texture, natural drainage, productivity, and other characteristics. Most of the county is silty, well drained soils on dissected uplands. Many of these soils are best suited to range and are used for livestock grazing. The uplands are transected by stream and river valleys, which generally extend from the northwest to the southeast. The valleys range from silty, well drained soils on stream terraces to sandy, poorly drained soils on bottom lands. Many of the soils in the valleys are excellent for cultivated crops if irrigated. Some areas in the western part of the county and other scattered locations are silty, well drained soils on tablelands. These soils are generally suited to and used for cultivated crops. The northwestern part of the county is sandy, excessively drained soils of the Nebraska Sandhills. These soils are

best suited to range and are used for livestock grazing.

Many of the soils in Custer County are susceptible to wind and water erosion. Conservation measures are needed to control erosion and reduce sedimentation in streams and rivers.

The first soil survey of Custer County was made in 1926 by the Department of Agriculture in cooperation with the Nebraska State Soil Survey (*3*). This new survey provides up-to-date information on the soils and on the advances that have been made in soil interpretation, engineering, and soil classification since the earlier survey was published. The present survey provides additional information and larger maps that show the soils in greater detail.

general nature of the county

This section provides general information on Custer County. It discusses the agricultural development, physiography, relief, drainage, water supply, and climate.

agriculture

The number of farms and ranches in the county has dropped from 1,770 in 1970 to 1,480 in 1979, primarily because individual operations have grown as agriculture has become increasingly mechanized and more efficient. Agricultural enterprises center around cattle production with grain and hay grown for feed. Hogs, sheep, and poultry are also produced. Farmers and ranchers can receive technical assistance from the Soil Conservation Service in planning and applying soil and water conservation practices to the land.

physiography and drainage

Most of Custer County is drained by the Middle Loup and South Loup Rivers and their tributaries. These streams and rivers flow in parallel courses in a generally southeasterly direction. Surface runoff in the southern part of the county is carried to the Platte River by Wood River and numerous small creeks. A small area in the southwestern part of the county is drained to the south.

The general physiography of Custer County is deeply dissected loess uplands with a few remnants of higher, gently rolling loess tablelands. The dissected loess uplands are transected by several lower lying, long, narrow, flat rivers and stream valleys. About one-tenth of the county, the northwest corner, is part of the broad expanse of the Nebraska Sandhills. This is the most sparsely populated part of the county and is used almost entirely for grazing cattle. The dissected loess uplands are also used mostly for grazing, but small areas are cultivated. The loess tablelands and river and stream valleys are intensively farmed, and much of the land in valleys is irrigated.

water supply

Wells throughout Custer County provide water for domestic and livestock use, industrial use, and irrigation.

On the uplands, water suitable for domestic use and for livestock is available from wells extending into deposits of Quaternary and Tertiary sand and gravel. In the tablelands the water table is many feet below the surface. In the areas of windblown sand and in the valleys the water table is a few feet to 100 feet deep.

Water for irrigating crops and for industrial use is available in nearly all parts of the county from wells extending into Tertiary deposits, principally the sandstone and sand and gravel of the Ogallala Formation. Wells yielding abundant good water can be developed in most parts of the county. There were 1,467 registered irrigation wells in Custer County as of January 1, 1980.

The water from shallow wells in the areas of windblown sand is soft or medium hard. Water from wells in the valleys and the uplands is hard or very hard. Water from a few of the wells contains enough iron to be objectionable for some domestic and industrial uses, but the iron is not a health hazard to people or livestock.

Ground water can become contaminated by drainage from feedlots, septic tanks, or other concentrations of waste. Contamination is more likely to occur in shallow wells than in deep wells. A new domestic well should be checked for contamination. Other domestic wells should be checked frequently when a spill of chemicals and oil or floodwater might have entered the well or the ground in the vicinity of the well.

climate

In Custer County, winters are cold because of frequent incursions of cold, continental air. Summers are hot with occasional interruptions of cooler air from the north. Snowfall is fairly frequent in winter, but snow cover is usually not continuous. Rainfall is heaviest in late spring and early summer. Annual precipitaion is normally adequate for wheat, sorghum, and range grasses.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Broken Bow, Nebraska, for the period 1951 to 1973. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 26 degrees F, and the average daily low is 13 degrees. The lowest temperature on record, which occurred at Broken Bow on January 27, 1963, is -36 degrees. In summer the average temperature is 72 degrees, and the average daily high is 86 degrees. The highest recorded temperature, which occurred on July 11, 1954, is 116 degrees.

Growing degree days shown in table 1 are equivalent to heat units. During the month, growing degree days

accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

Of the total annual precipitation, 18 inches, or 80 percent, usually falls from April through September, which includes the growing season for most crops. In 2 years out of 10, the rainfall from April through September is less than 14 inches. The heaviest 1-day rainfall during the period of record was 4.72 inches at Broken Bow on August 10, 1968. Thunderstorms occur on about 50 days each year, and most occur in summer.

Average seasonal snowfall is 29 inches. The greatest recorded snow depth is 21 inches. On an average, 18 days have at least 1 inch of snow on the ground, but the number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 50 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The percentage of possible sunshine is 75 in summer and 60 in winter. The prevailing wind is from the northwest. Average windspeed is highest, 13 miles per hour, in April.

Severe duststorms occur occasionally in spring when strong dry winds blow over unprotected soils. There are occasional tornadoes and severe thunderstorms, some with hail. These storms are local and short, and the pattern of damage is variable and spotty.

Climatic data for this section were especially prepared for the Soil Conservation Service by the National Climatic Center, Asheville, North Carolina.

how this survey was made

Soil scientists made this survey to learn what soils are in the survey area, where they are, and how they can be used. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; and the kinds of rock. They dug many holes to study soil profiles. A profile is the sequence of natural layers, or horizons, in a soil. It extends from the surface down into the parent material, which has been changed very little by leaching or by plant roots.

The soil scientists recorded the characteristics of the profiles they studied and compared those profiles with others in nearby counties and in more distant places. They classified and named the soils according to nationwide uniform procedures. They drew the boundaries of the soils on aerial photographs. These photographs show trees, buildings, fields, roads, and other details that help in drawing boundaries accurately. The soil maps at the back of this publication were prepared from aerial photographs.

The areas shown on a soil map are called map units. Most map units are made up of one kind of soil. Some are made up of two or more kinds. The map units in this survey area are described under "General soil map units" and "Detailed soil map units."

While a soil survey is in progress, samples of some soils are taken for laboratory measurements and for engineering tests. All soils are field tested to determine their characteristics. Interpretations of those characteristics may be modified during the survey. Data are assembled from other sources, such as test results, records, field experience, and state and local specialists. For example, data on crop yields under defined management are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it can be used by farmers, rangeland and woodland managers, engineers, planners, developers and builders, home buyers, and others.

general soil map units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each soil association on the general soil map is a unique natural landscape. Typically, an association consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one association can occur in other units but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one soil association differ from place to place in slope, depth, drainage, and other characteristics that affect management.

nearly level to hilly, sandy soils of the sandhills

The three associations in this group occupy about 16.8 percent of the county. The soils are sandy, somewhat poorly drained and excessively drained, and nearly level to hilly. Most of the acreage of these associations is in native grasses and is used for grazing. Wind erosion is the main problem, and maintaining good range condition is the main concern.

1. Valentine association, rolling and hilly

Deep, rolling and hilly, excessively drained, sandy soils on uplands

This association consists of rolling and hilly sand dunes of the sandhills (fig. 2). This association occupies about 81,440 acres, or about 5.0 percent of the county. Valentine soils make up about 95 percent of the association. The rest is minor soils.

The surface layer of these Valentine soils is grayish brown fine sand about 6 inches thick. The next 8 inches is pale brown fine sand. The underlying material is very pale brown fine sand to a depth of 60 inches.

Minor soils in this association are mainly of the Els, Hersh, and Ipage soils. These soils are in swales below the Valentine soils.

Most of the acreage of this unit is used for grazing livestock. The soils are generally not suited to farming because of the very severe hazard of wind erosion, steep and irregular slopes, very low available water capacity, and low fertility.

Wind erosion is a hazard in overgrazed or cultivated areas. Maintaining the plant cover in good condition and controlling wind erosion are the major concerns.

Ranches in this association average about 3,000 acres in size. Roads are very few; only one hard-surfaced road runs through the major part of this association. Cattle are marketed mainly within the county or in adjacent counties.

2. Valentine association

Deep, nearly level to rolling, excessively drained, sandy soils on uplands

This association consists of nearly level to rolling sand dunes and swales of the sandhills. This association occupies about 183,930 acres, or about 11.2 percent of the county. Valentine soils make up about 95 percent of the association. The rest is minor soils.

The surface layer of these Valentine soils is grayish brown fine sand or loamy fine sand about 6 inches thick. The next 6 inches is light brownish gray fine sand. The underlying material is light gray fine sand to a depth of 60 inches.

Minor soils in this association are mainly of the Hersh and Gates series. Hersh and Gates soils are in nearly level to gently sloping swales and are generally below the Valentine soils.

Most of the acreage of this unit is used for grazing livestock. Much of this assocation is poorly suited to farming because of a severe hazard of wind erosion, steep slope, low fertility, very high water intake rate, and low available water capacity. There is an abundant supply of ground water of good quality.

Wind erosion is a hazard in overgrazed or cultivated areas. Maintaining a good plant cover and preventing wind erosion are the major concerns.

Ranches in this association average about 3,000 acres in size. Roads are very few; only two hard-surfaced roads run through the major part of the association. Cattle are marketed mainly within the county or in adjacent counties.

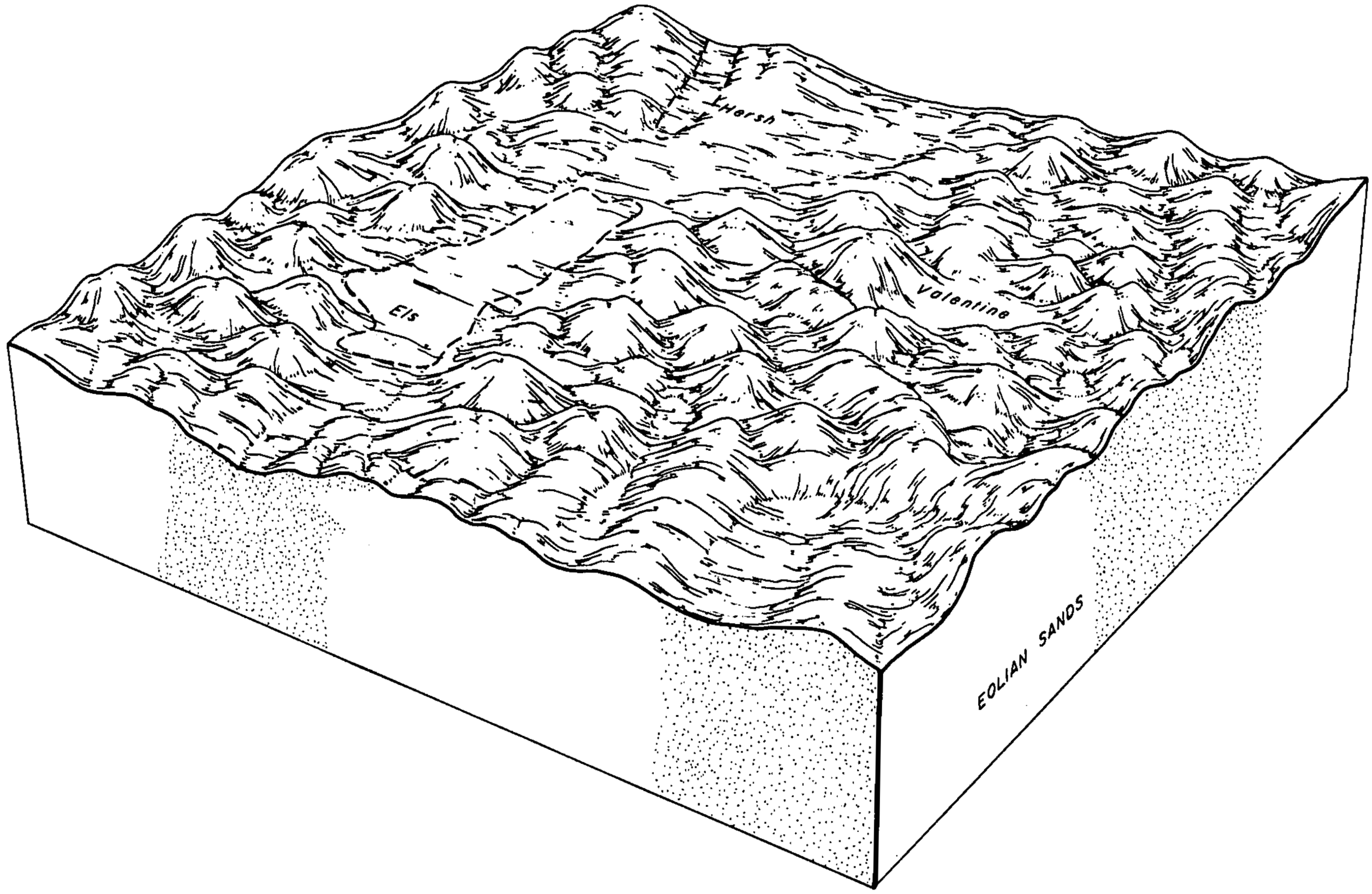

Figure 2.—Typical pattern of soils in the Valentine association, rolling and hilly, and relationship of soils to topography and parent material.

3. Valentine-Els association

Deep, nearly level to rolling, excessively drained and somewhat poorly drained, sandy soils in sandhill valleys

This association consists of nearly level to rolling sandhills. Smooth, nearly level to sloping swales are between hummocks in the sandhill valleys. This association occupies about 9,200 acres, or about 0.6 percent of the county. Valentine soils make up about 60 percent of the association, and Els soils make up about 40 percent.

Valentine soils are in nearly level to rolling, hummocky areas. They are excessively drained. The surface layer is grayish brown fine sand about 6 inches thick. The next 6 inches is light brownish gray fine sand. The underlying material is light gray fine sand to a depth of 60 inches.

Els soils are in nearly level swales below the Valentine soils. They are somewhat poorly drained. The surface layer is dark grayish brown fine sand about 6 inches thick. The next 3 inches is grayish brown fine sand. The underlying material is light brownish gray fine sand in the upper part and light gray, mottled fine sand in the lower part to a depth of 60 inches.

Most of the acreage of this association is used for both grazing livestock and producing hay. Much of the area is poorly suited to irrigation because of the severe wind erosion hazard, low fertility, very high water intake rate, and low available water capacity. There is, however, an abundant supply of ground water of good quality.

Wind erosion is a hazard in overgrazed or cultivated areas. Maintaining a good plant cover and controlling wind erosion are the major concerns.

Ranches in this association average about 2,000 acres in size. Roads are very few; only one paved highway runs through the eastern part of the association. Cattle are marketed mainly within the county or in adjacent counties.

strongly sloping to very steep, silty and loamy soils on dissected uplands

The two associations in this group occupy about 59.5 percent of the county. The soils are silty and loamy, well drained to excessively drained, and strongly sloping to very steep. Most of the acreage of these associations is used for grazing. Water erosion is the main problem, and maintaining good range condition is the main concern.

4. Uly-Coly association

Deep, strongly sloping to very steep, well drained to excessively drained, silty soils on uplands

This association consists mainly of strongly sloping to very steep, dissected uplands (fig. 3). Narrow ridges have dominantly steep and very steep, irregular sides that extend to very narrow bottom lands of intermittent drainageways. This association occupies about 928,770 acres, or about 56.6 percent of the county. Uly soils make up about 48 percent of this association, and Coly soils make up about 32 percent. The remaining 20 percent is minor soils.

Uly soils are on strongly sloping ridgetops and steep side slopes. They are well drained and somewhat excessively drained. The surface layer is dark grayish brown, friable silt loam about 10 inches thick. The subsoil is about 15 inches thick. It is grayish brown, friable silt loam in the upper part; light brownish gray silt loam in the middle part; and light gray, calcareous silt loam in the lower part. The underlying material is white silt loam to a depth of 60 inches.

Coly soils are on narrow ridgetops and strongly sloping to very steep sides of hills and canyons. They are well drained to excessively drained. The surface layer is light brownish gray, friable silt loam about 4 inches thick. The underlying material is very pale brown, calcareous silt loam to a depth of 60 inches.

Minor soils in this association are of the Hobbs, Holdrege, and Hord series. Hobbs soils are on nearly level bottom lands of intermittent drainageways and are

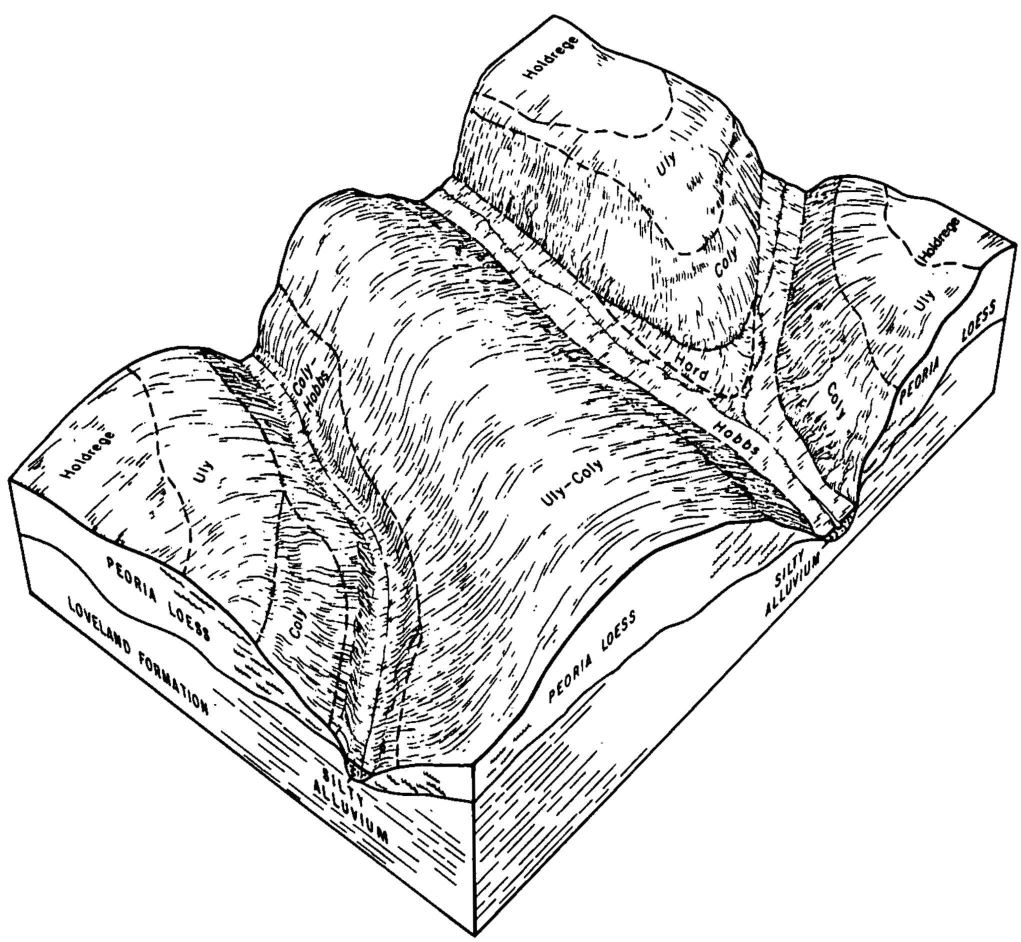

Figure 3.—Typical pattern of soils in the Uly-Coly association and relationship of soils to topography and parent material.

occasionally flooded. Holdrege soils are on ridgetops and lower parts of side slopes. Hord soils are on foot slopes and stream terraces adjacent to the narrow bottom lands.

Ranching is the dominant enterprise and consists mainly of cow-calf operations. A few areas are cultivated. The principal crops are corn, grain sorghum, wheat, and alfalfa. These soils are generally too steep for irrigation.

Water erosion is the main hazard. Using a planned grazing system and preventing water erosion are major concerns.

Ranches in this association average about 2,500 acres in size. Roads are few because ranch headquarters are widely scattered. A few paved roads and highways pass through the association. Feeder cattle and calves are marketed within the county or in adjacent counties. Most crops are fed to livestock on the farm.

5. Gates-Hersh association

Deep, strongly sloping to very steep, well drained to excessively drained, loamy soils on uplands

This association consists of strongly sloping to very steep dissected uplands in sand-loess transition areas adjacent to the sandhills. This association occupies about 46,680 acres, or about 2.9 percent of the county. Gates soils make up about 45 percent of this association, and Hersh soils make up about 30 percent. The remaining 25 percent is minor soils.

Gates soils are generally on steep and very steep canyon sides and narrow ridgetops on dissected uplands. They are well drained to excessively drained. Typically, the surface layer is light gray, friable very fine sandy loam about 5 inches thick. The next 13 inches is very pale brown very fine sandy loam. The underlying material is light gray, calcareous very fine sandy loam to a depth of 60 inches.

Hersh soils are on narrow, strongly sloping ridgetops and steep side slopes between the deeply dissected canyons. They are well drained to somewhat excessively drained. Typically, the surface layer is grayish brown, very friable fine sandy loam about 5 inches thick. The next 5 inches is grayish brown fine sandy loam. The underlying material is pale brown fine sandy loam to a depth of 60 inches.

Minor soils in this association are of the Valentine and Hobbs series. Valentine soils are in the same positions as Hersh soils. Hobbs soils are on the narrow bottom lands of upland drainageways below the Gates and Hersh soils.

Ranching is the dominant enterprise and consists mainly of cow-calf operations.

Wind erosion is a hazard in overgrazed or cultivated areas. Maintaining a good plant cover and preventing erosion are the major concerns.

Ranches in this association average about 2,000 acres in size. Roads are few because ranch headquarters are widely scattered. Gravel or improved dirt roads are the main kind. Cattle and calves are marketed within the county or in adjacent counties.

nearly level to strongly sloping, silty and loamy soils on uplands

The two associations in this group occupy about 8.7 percent of the county. The soils are silty and loamy, well drained, and nearly level to strongly sloping. Most of the acreage of these associations is farmed under both dryland managment and irrigation. Water and wind erosion are the main problems.

6. Holdrege-Hall-Hord association

Deep, nearly level to strongly sloping, well drained, silty soils on uplands

This association consists mainly of nearly level to strongly sloping soils on uplands (fig. 4). This association occupies about 131,800 acres, or about 8.0 percent of the county. Holdrege soils make up about 60 percent of this association, Hall soils make up 15 percent, and Hord soils make up 15 percent. The remaining 10 percent is minor soils.

Holdrege soils are on long, narrow, very gently sloping to strongly sloping ridgetops and side slopes. The surface layer is dark grayish brown, friable silt loam about 10 inches thick. The subsoil is about 22 inches thick. It is dark grayish brown, firm silty clay loam in the upper part; brown, firm silty clay loam in the middle part; and very pale brown, friable silt loam in the lower part. The underlying material is light gray, calcareous silt loam to a depth of 60 inches.

Hall soils are in long, narrow, nearly level and very gently sloping swales between ridges and below the Holdrege soils. The surface layer is dark grayish brown, friable silt loam about 17 inches thick. The subsoil is about 19 inches thick. It is dark grayish brown, firm silty clay loam in the upper part and light brownish gray, friable silt loam in the lower part. The underlying material is very pale brown silt loam in the upper part and light gray, calcareous silt loam in the lower part to a depth of 60 inches.

Hord soils are in long, narrow, nearly level and very gently sloping swales between ridges and below the Holdrege soils. The surface layer is grayish brown, friable silt loam about 13 inches thick. The subsoil is grayish brown, friable silt loam about 27 inches thick. The underlying material is brown silt loam to a depth of 60 inches.

Minor soils of this association are mainly of the Fillmore Variant and the Hobbs, Scott, and Uly series. Fillmore Variant and Scott soils are in upland depressions and are ponded during part of the year. Hobbs soils are on bottom lands along upland drainageways. Uly soils are on side slopes commonly adjacent to Holdrege soils.

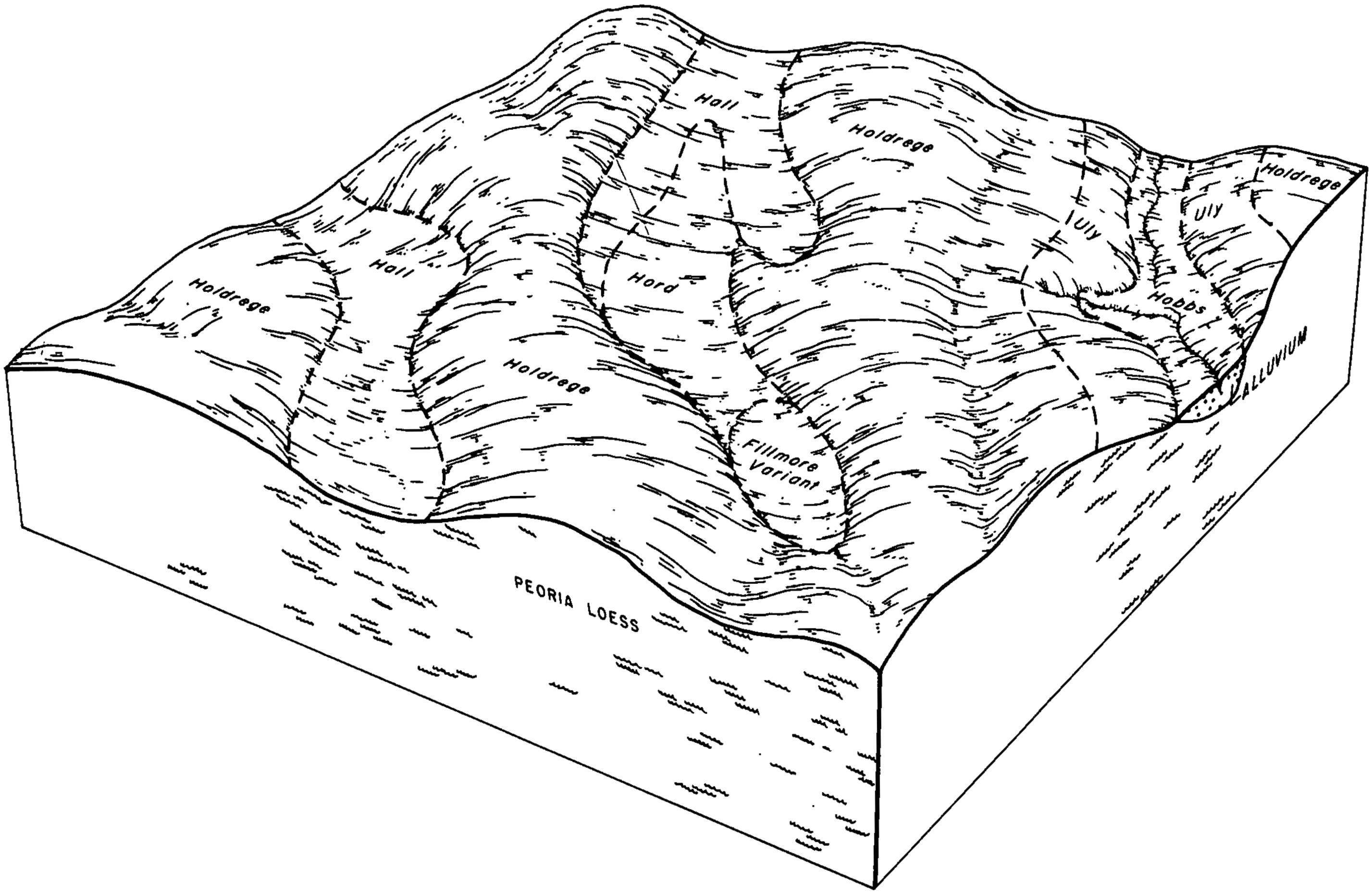

Figure 4.—Typical pattern of soils in the Holdrege-Hall-Hord association and relationship of soils to topography and parent material.

Farms in this association are mainly cash grain-livestock enterprises. Corn, grain sorghum, wheat, and alfalfa are the major crops. The soils are dryfarmed or irrigated with sprinkler or gravity systems. Irrigation wells are usually several hundred feet deep.

The hazard of water erosion is slight or moderate on the nearly level to gently sloping soils but is severe on the strongly sloping Holdrege soils. Control of water erosion is needed. Depressional areas need surface drainage.

Farms in the association average about 480 acres in size. Gravel or improved dirt roads are along most section lines. A few paved roads and highways pass through some areas of this association. Farm produce and livestock are marketed mainly within the county or in adjacent counties. Most grain is stored on the farm and fed to livestock.

7. Hersh-Gates-Kenesaw association

Deep, nearly level to strongly sloping, well drained, loamy soils on uplands

This association consists of nearly level to strongly sloping soils on uplands in loess-sand transition areas adjacent to the sandhills. This association occupies about 10,630 acres, or about 0.7 percent of the county. Hersh soils make up about 48 percent of this association, Gates soils make up 22 percent, and Kenesaw soils make up 10 percent. The remaining 20 percent is minor soils.

Hersh soils are on tops and sides of ridges on tablelands. These soils are nearly level to strongly sloping. The surface layer is grayish brown, very friable fine sandy loam about 5 inches thick. The next 5 inches is grayish brown fine sandy loam. The underlying material is pale brown fine sandy loam to a depth of 60 inches.

Gates soils are also on tops and sides of ridges on tablelands. They are gently sloping and strongly sloping. The surface layer is light gray, friable very fine sandy loam about 5 inches thick. The next 13 inches is very pale brown, very fine sandy loam. The underlying material is light gray very fine sandy loam to a depth of 60 inches.

Kenesaw soils are in smooth sloping swales below the Hersh and Gates soils. They are nearly level to very gently sloping. The surface layer is grayish brown, friable very fine sandy loam about 10 inches thick. The subsoil is light brownish gray, friable very fine sandy loam about 7 inches thick. The underlying material is light gray very fine sandy loam to a depth of 60 inches. The lower part of the underlying material is calcareous.

Minor soils in this association are mainly of the Anselmo, Holdrege, and Valentine series. Anselmo soils are in swales below the Hersh soils. Holdrege soils are on ridgetops and side slopes. Valentine soils are on hummocky ridges.

Farms and ranches in this association are mainly cash grain-livestock enterprises. Corn, grain sorghum, wheat, and alfalfa are the main crops. The soils are mainly dryfarmed, but a few areas are irrigated with center-pivot sprinkler systems.

The hazard of wind and water erosion is moderate or severe on these nearly level to strongly sloping soils. Drought is possible, so conserving moisture and using good conservation tillage are important. Maintaining soil fertility is also a concern.

Farms in this association average about 640 acres in size. A few gravel and improved dirt roads pass through this association. Farm produce and livestock are marketed mainly within the county or in adjacent counties. Grain is usually stored on the farm and fed to livestock.

nearly level to gently sloping, silty soils on stream terraces and in valleys

The three associations in this group occupy about 7.0 percent of the county. The soils are silty, well drained, and nearly level to gently sloping. Most of the acreage of these associations is farmed under irrigation. Efficient use of irrigation water is the main concern.

8. Cozad association

Deep, nearly level to gently sloping, well drained, silty soils on stream terraces

This association consists mainly of nearly level to gently sloping soils in long, narrow areas parallel to major rivers and streams (fig. 5). This association occupies about 64,500 acres, or about 3.9 percent of the county. Cozad soils make up about 55 percent of this association, and the rest is minor soils.

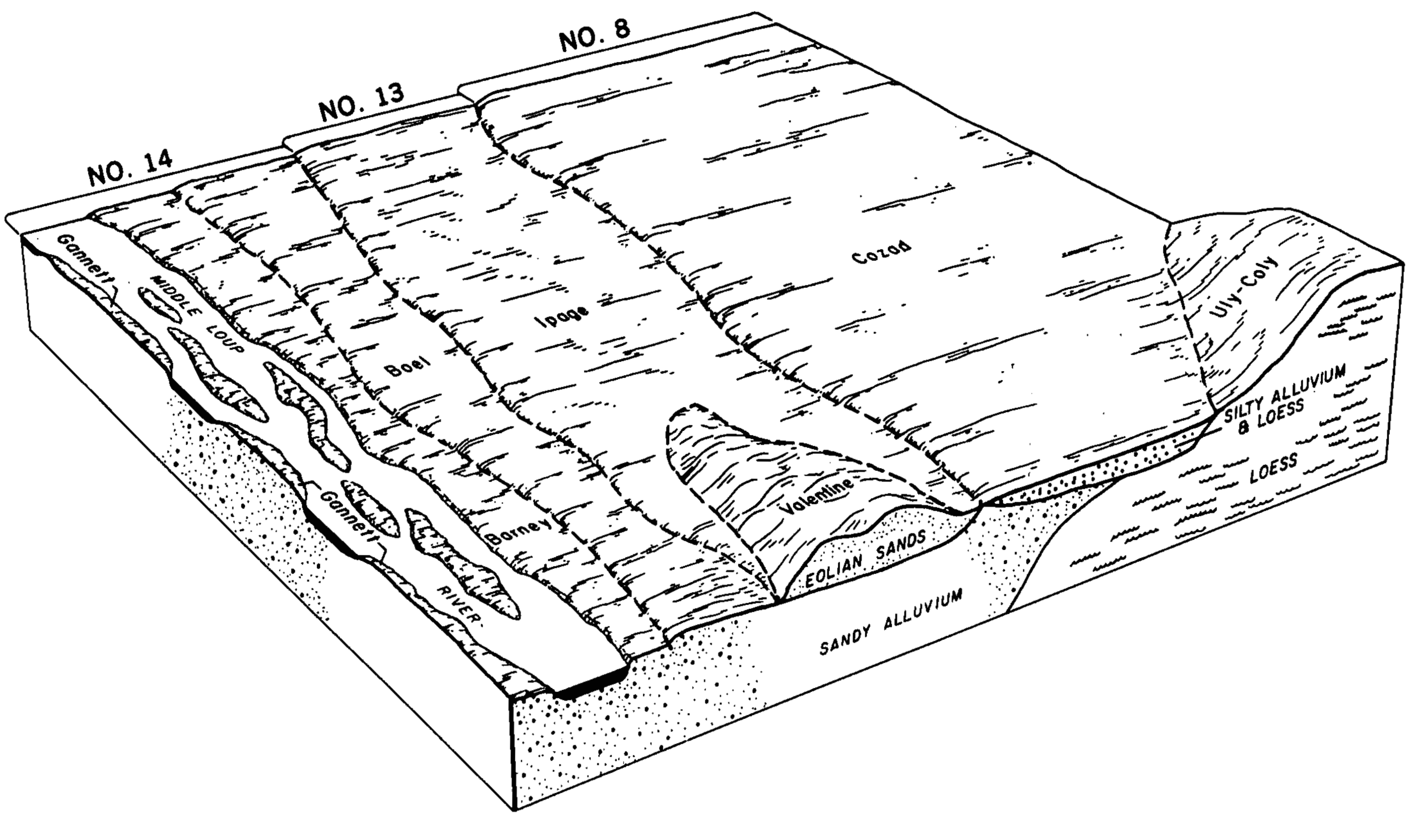

Figure 5.—Typical pattern of soils and relationship of soils to topography and parent material in three associations: No. 8—Cozad association; No. 13—Ipage-Valentine association; No. 14—Boel-Barney-Gannett association.

Cozad soils are in long, smooth areas on stream terraces. Typically, the surface layer is dark grayish brown, friable silt loam about 12 inches thick. The subsoil is grayish brown, friable silt loam about 10 inches thick. The underlying material is light brownish gray stratified very fine sandy loam to a depth of 60 inches.

Minor soils in this association are mainly of the Hersh, Hobbs, and Hord series. Hersh soils are on nearly level to gently sloping ridges above the Cozad soils. Hobbs soils are on narrow bottom lands below Cozad soils. Hord soils are in the same positions as Cozad soils.

Farms in this association are mainly combination cash grain-livestock enterprises. Most areas are gravity irrigated, and corn and alfalfa are the main crops. High-producing wells can be drilled in most areas of this association; however, along the Middle Loup River much of the irrigation water comes from the Sargent irrigation canal.

Efficiently managing irrigation water and reducing wind erosion are the main concerns.

Farms in this association average about 640 acres in size. Gravel or improved dirt roads are along most section lines. A few paved highways pass through this association. Farm produce is marketed mainly within the county or in adjacent counties. Grain is generally stored on the farm and fed to livestock.

9. Hord-Cozad association

Deep, nearly level to gently sloping, well drained, silty soils on stream terraces

This association consists of nearly level to gently sloping soils in long, narrow areas parallel to major rivers and streams. This association occupies about 38,150 acres, or about 2.3 percent of the county. Hord soils make up about 55 percent of this association, and Cozad soils make up about 20 percent. The remaining 25 percent is minor soils.

Hord soils are in long, smooth areas on stream terraces. The surface layer is dark grayish brown, friable silt loam about 17 inches thick. The subsoil is dark grayish brown, friable silt loam about 11 inches thick. The underlying material is very pale brown silt loam to a depth of 60 inches.

Cozad soils are in long, smooth areas on stream terraces. The surface layer is dark grayish brown, friable silt loam about 10 inches thick. The subsoil is grayish brown silt loam about 10 inches thick. The underlying material is light brownish gray stratified very fine sandy loam to a depth of 60 inches.

Minor soils in this association are mainly of the Hobbs series. Hobbs soils are on narrow bottom lands below Hord and Cozad soils.

Farms in this association are mainly combination cash grain-livestock enterprises. Corn and alfalfa are the main crops. These soils are generally gravity irrigated. High-producing wells can be drilled in this association.

Efficiently managing irrigation water and reducing wind erosion are the main concerns.

Farms in this association average about 640 acres in size. Gravel or improved dirt roads are along most section lines. A few paved highways pass through this association. Farm produce is marketed mainly within the county or in adjacent counties. Grain is generally stored on the farm and fed to livestock.

10. Hord-Hall-Cozad association

Deep, nearly level to gently sloping, well drained, silty soils in valleys

This association consists of nearly level to gently sloping soils in smooth areas in valleys that are surrounded by dissected uplands. This association occupies about 13,100 acres, or about 0.8 percent of the county. Hord soils make up about 35 percent of this association, Hall soils make up 20 percent, and Cozad soils make up 15 percent. The remaining 30 percent is minor soils.

Hord soils are in nearly level or very gently sloping valleys. The surface layer is about 12 inches thick. It is grayish brown, friable silt loam in the upper part and dark grayish brown, friable silt loam in the lower part. The subsoil is grayish brown and pale brown, friable silt loam about 18 inches thick. The underlying material is light gray silt loam to a depth of 60 inches.

Hall soils are nearly level and very gently sloping and are slightly lower than Hord and Cozad soils. Typically, the surface layer is dark grayish brown, friable silt loam about 17 inches thick. The subsoil is about 19 inches thick. It is dark grayish brown, firm silty clay loam in the upper part and light brownish gray, friable silt loam in the lower part. The underlying material is very pale brown silt loam in the upper part and light gray, calcareous silt loam in the lower part to a depth of 60 inches.

Cozad soils are adjacent to Hord soils in nearly level and gently sloping valleys. Typically, the surface layer is grayish brown, friable silt loam about 10 inches thick. The subsoil is light brownish gray, friable silt loam about 10 inches thick. The underlying material is light gray, stratified very fine sandy loam in the upper part and grayish brown, very fine sandy loam in the lower part.

Minor soils in this association are mainly of the Fillmore Variant and the Graybert, Hersh, and Kenesaw series. Fillmore Variant soils are in depressions and are ponded during part of the year. Graybert and Kenesaw soils are in similar positions, and Hersh soils are slightly higher.

Farms in this association are mainly combination cash grain-livestock enterprises. Corn and alfalfa are the main crops. Most of these soils are gravity irrigated. High-producing irrigation wells can be drilled in this association.

Efficiently managing irrigation water and controlling wind erosion are the main concerns.

Farms in this association average about 640 acres in size. Gravel or improved dirt roads are along most section lines. A few paved highways pass through this association. Farm produce and livestock are generally marketed within the county or in adjacent counties. Grain is usually stored on the farm and fed to livestock.

nearly level to strongly sloping, silty, loamy, and sandy soils in valleys and on stream terraces

The two associations in this group occupy about 5.8 percent of the county. The soils are silty and loamy, well drained, and nearly level to strongly sloping. Most of the acreage of these associations is farmed, both dryland and irrigated. The main problems are water erosion and wind erosion. Controlling erosion, conserving moisture, and managing irrigation water are the main concerns.

11. Kenesaw-Hord-Gates association

Deep, nearly level to strongly sloping, well drained, loamy and silty soils in valleys

This association consists of nearly level to strongly sloping soils in valleys in loess-sand transition areas (fig. 6). This association occupies about 47,100 acres, or about 2.9 percent of the county. Kenesaw soils make up about 31 percent of this association, Hord soils make up 25 percent, and Gates soils make up 14 percent. The remaining 30 percent is minor soils.

Kenesaw soils are in long, smooth areas below the Gates soils. They are nearly level and very gently sloping. The surface layer is grayish brown, friable very fine sandy loam about 10 inches thick. The subsoil is light brownish gray, friable very fine sandy loam about 7 inches thick. The underlying material is light gray very fine sandy loam to a depth of 60 inches.

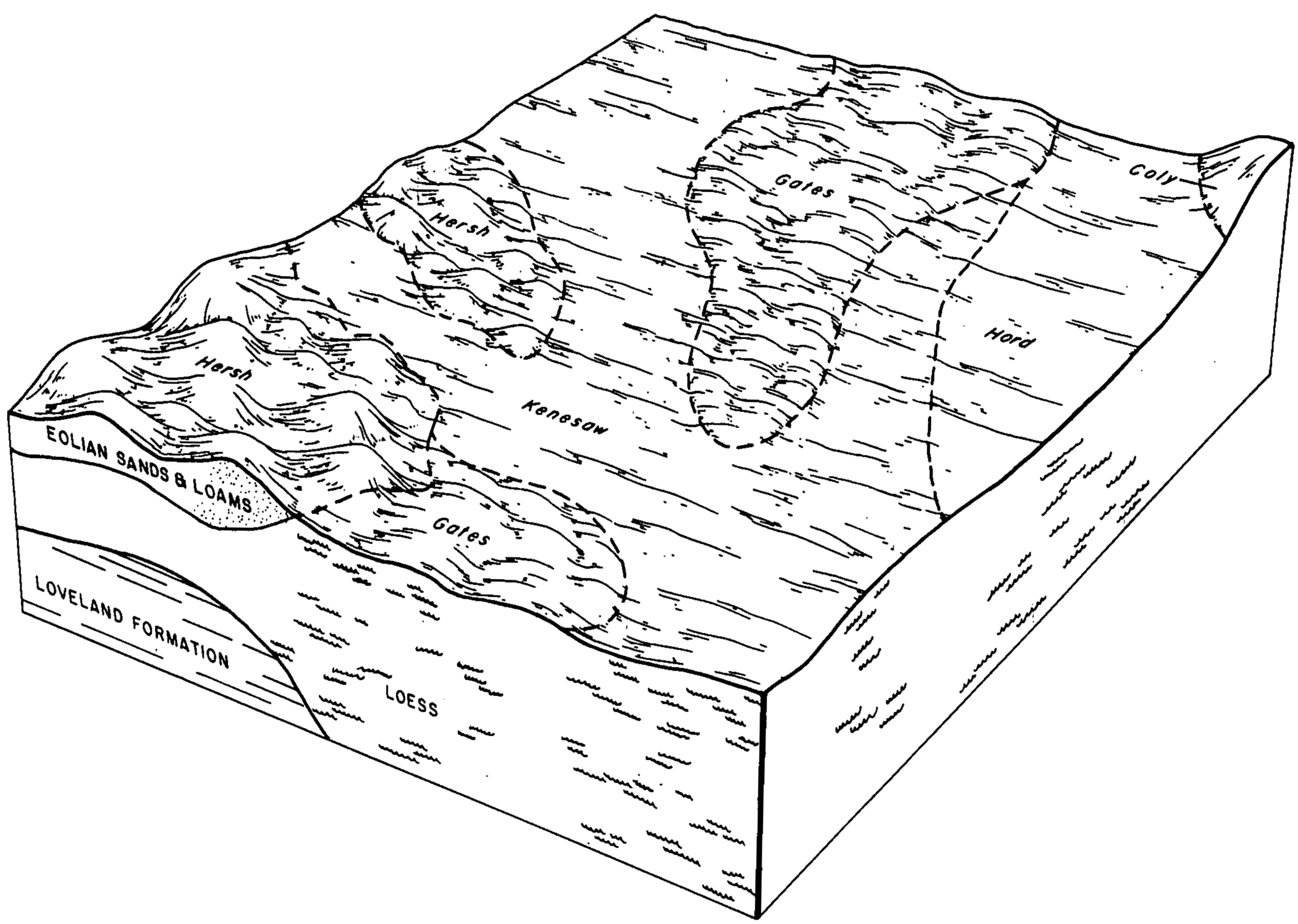

Figure 6.—Typical pattern of soils in the Kenesaw-Hord-Gates association and relationship of soils to topography and parent material.

Hord soils are in long, smooth areas adjacent to the Kenesaw soils. They are nearly level to very gently sloping. The surface layer is grayish brown, friable silt loam about 13 inches thick. The subsoil is grayish brown silt loam about 27 inches thick. The underlying material is brown silt loam to a depth of 60 inches.

Gates soils are on convex ridges above the Kenesaw soils. They are gently sloping and strongly sloping. The surface layer is light gray, friable very fine sandy loam about 5 inches thick. The next 13 inches is very pale brown very fine sandy loam. The underlying material is light gray very fine sandy loam to a depth of 60 inches.

Minor soils in this association are mainly of the Graybert, Hersh, and Rusco series. Graybert soils are in the same positions as Kenesaw soils. Hersh soils are on gently sloping and strongly sloping ridges. Rusco soils are in nearly level depressions and are ponded for short periods.

Farms in this association are mainly combination cash grain-livestock enterprises. Corn, grain sorghum, wheat, and alfalfa are the major crops. Most of these soils are irrigated by sprinkler or gravity systems. Where gravity irrigated, these soils are generally leveled to establish a suitable grade. High-producing wells can be drilled in this association. Center-pivot irrigation is used where the soils are too steep for gravity systems.

Efficiently managing irrigation water and reducing erosion are the major concerns.

Farms in this association average about 480 acres in size. Gravel or improved dirt roads are along most section lines. A few paved roads and highways pass through the association. Farm produce and livestock are marketed mainly within the county or in adjacent counties. Most grain is stored on the farm and fed to livestock.

12. Anselmo-Cozad association

Deep, nearly level to gently sloping, well drained, loamy, silty, and sandy soils on stream terraces

This association consists of nearly level to gently sloping soils in narrow areas on stream terraces. This association occupies about 48,000 acres, or about 2.9 percent of the county. Anselmo soils make up 45 percent of this association, and Cozad soils make up 20 percent. The remaining 35 percent is minor soils.

Anselmo soils are in long, smooth areas on stream terraces. The surface layer is grayish brown, friable fine sandy loam or loamy fine sand about 14 inches thick. The subsoil is pale brown fine sandy loam about 8 inches thick. The underlying material is light gray fine sandy loam to a depth of 60 inches.

Cozad soils are also in long, smooth areas on stream terraces. The surface layer is gray, friable silt loam about 9 inches thick. The subsoil is about 14 inches thick. It is grayish brown, friable silt loam in the upper part and light brownish gray silt loam in the lower part. The underlying material is light gray stratified very fine sandy loam to a depth of 60 inches. The lower part of the underlying material is calcareous.

Minor soils in this association are mainly of the Boel, Dunday, Gannett, Hersh, and Ovina series. Boel soils are on low bottom lands. Dunday and Hersh soils are in long, smooth, nearly level and very gently sloping areas on the stream terraces. Gannett and Ovina soils are in nearly level areas or swales below Anselmo and Cozad soils.

Farms in this association are mainly combination cash grain-livestock enterprises. Corn and alfalfa are the main crops. Most of these soils are irrigated by sprinkler or gravity systems. Where gravity irrigated, these soils are generally leveled to establish a suitable grade. Sprinkler irrigation systems are commonly used where the soils are too sandy for gravity systems.

Controlling wind erosion, efficiently managing irrigation water, and maintaining soil fertility are major concerns.

Farms in this association average about 640 acres in size. Gravel or improved dirt roads are along only a few section lines. A paved road is along the north side of the South Loup River in one part of this association. Farm produce and livestock are marketed mainly within the county or in adjacent counties. Most grain is stored on the farm and fed to livestock.

nearly level to rolling, sandy soils on stream terraces

The one association in this group occupies about 1.4 percent of the county. The soils are sandy, moderately well drained and excessively drained, and nearly level to rolling. Most of the acreage of this association is used for grazing. Wind erosion is the main problem, and maintaining good range condition is the main concern.

13. Ipage-Valentine association

Deep, nearly level to rolling, moderately well drained and excessively drained, sandy soils on stream terraces

This association consists of nearly level soils in long, narrow areas on stream terraces adjacent to the Middle Loup River (fig. 5). The terraces include intermittent rolling, hummocky ridges. This association occupies about 23,320 acres, or about 1.4 percent of the county. Ipage soils make up about 30 percent of this association, and Valentine soils make up about 30 percent. The remaining 40 percent is minor soils.

Ipage soils are in long, narrow areas on the stream terraces below the Valentine soils. They are nearly level and moderately well drained. The surface layer is grayish brown, loose loamy fine sand about 7 inches thick. The next 5 inches is grayish brown, loamy fine sand. The underlying material is light gray fine sand to a depth of 60 inches.

Valentine soils are on rolling, intermittent hummocky ridges on stream terraces above the Ipage soils. They are excessively drained. The surface layer is grayish brown, loose loamy fine sand or fine sand about 6 inches thick. The next 6 inches is light brownish gray fine sand. The underlying material is light gray fine sand to a depth of 60 inches.

Minor soils in this association are mainly of the Cozad, Hersh, and Ovina series. Cozad and Hersh soils are nearly level and are slightly higher than the Ipage soils but below the Valentine soils. Ovina soils are in swales and are below the Ipage soils.

Farms and ranches in this association are diversified and consist mainly of cash grain and livestock enterprises. Nearly all of this association is used for grazing by livestock. A few areas are irrigated with center-pivot irrigation systems. High-producing wells can be drilled in this association.

Maintaining range in good condition and reducing soil loss to wind erosion are the major concerns.

Farms and ranches in this association average about 1,000 acres in size. Gravel or improved dirt roads are few and generally run parallel to the association, crossing in only a few locations. One paved road runs parallel to this association. Livestock is marketed within the county or in adjacent counties.

nearly level, loamy and sandy soils on bottom lands

The association in this group occupies about 0.8 percent of the county. The soils are loamy and sandy, poorly drained and somewhat poorly drained, and nearly level. Most of the acreage of these associations is used for grazing. The main problem is wetness caused by the high water table and flooding. Maintaining good range condition is the main concern.

14. Boel-Barney-Gannett association

Deep, nearly level, somewhat poorly drained and poorly drained, sandy and loamy soils on bottom lands

This association consists of long, narrow areas on bottom lands of the Middle Loup and South Loup Rivers (fig. 5). This association occupies about 13,100 acres, or about 0.8 percent of the county. Boel soils make up about 30 percent of this association, Barney soils make up 13 percent, and Gannett soils make up 8 percent. The remaining 49 percent is minor soils.

Boel soils are in long, narrow areas parallel to the Middle Loup River channel. They are slightly higher than the Barney soils. They are somewhat poorly drained. The surface layer is dark grayish brown, very friable, calcareous loamy fine sand or fine sandy loam about 10 inches thick. The next 6 inches is grayish brown, calcareous loamy fine sand. The underlying material is fine sand to a depth of 60 inches. It is light brownish gray in the upper part and white in the lower part.

Barney soils are in long, narrow areas parallel to and adjacent to river channels. They are below the Boel soils. They are poorly drained. The surface layer is very dark grayish brown, very friable, stratified calcareous fine sandy loam about 7 inches thick. The underlying material is stratified very pale brown and light gray fine sand to a depth of 60 inches.

Gannett soils are in long, narrow areas parallel to and adjacent to the river channels and below the Boel soils. They are poorly drained. The surface layer is about 20 inches thick. It is dark grayish brown, very friable, calcareous loam in the upper part and dark gray loam in the lower part. The next 5 inches is light gray fine sandy loam. The underlying material is light gray, stratified fine sand to a depth of 60 inches.

Minor soils are mainly of the Cass, Inavale, Loup, Ord, and Ovina series. Cass and Ovina soils are on nearly level stream terraces above the Boel soils. Inavale soils are in higher positions adjacent to river channels above the Boel soils. Ord soils are in the same positions as Boel soils. The Middle Loup and South Loup Rivers run through this association.

The soils in this association are generally a part of farms and ranches headquartered in adjacent associations. The soils are used mainly for grazing or hay because they are too wet and sandy for farming.

Proper range management is the major concern.

Ranches in this association average about 1,000 acres in size. Gravel or improved dirt roads are few and generally run parallel to the major stream, crossing in only a few locations. Livestock is marketed within the county or in adjacent counties.

detailed soil map units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and management of the soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Holdrege silt loam, 1 to 3 percent slopes, is one of several phases in the Holdrege series.

Some map units are made up of two or more major soils. These map units are called soil complexes.

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Hersh-Valentine complex, 15 to 30 percent slopes, is an example.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Pits, gravel, is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

AfB—Anselmo loamy fine sand, 0 to 3 percent slopes. This deep, nearly level and very gently sloping, well drained soil is on stream terraces. It formed in loamy eolian material. Individual areas range from 10 to 100 acres in size.

Typically, the surface layer is grayish brown, loose loamy fine sand about 10 inches thick. The subsoil is friable fine sandy loam 20 inches thick. It is brown in the upper part and pale brown in the lower part. The underlying material is fine sandy loam to a depth of 60 inches. It is light gray in the upper part and very pale brown in the lower part. In some places the surface layer is lighter in color or the underlying material has thin layers of loamy fine sand and fine sand.

Included with this soil in mapping are small areas of Dunday and Cozad soils. Dunday soils have more sand throughout. Cozad soils are in similar positions but have more clay throughout the profile. Inclusions make up 10 to 20 percent of this map unit.

Permeability is moderately rapid, and available water capacity is moderate. Runoff is slow. Organic matter content is moderately low, and natural fertility is medium. Water intake rate is high.

Most of the acreage of this soil is farmed. Some areas are in native grass.

If dryfarmed, this soil is suited to corn, grain sorghum, wheat, and alfalfa. Wind erosion is severe when the surface is not protected by plant cover or adequate crop residue. Stripcropping, stubble-mulch tillage, field windbreaks, and leaving crop residue on the surface help to control wind erosion and conserve moisture. Establishing a good seedbed is difficult because the soil dries rapidly and is easily blown.

If irrigated, this soil is suited to corn, grain sorghum, and alfalfa and grasses for hay or pasture. Nearly level areas are suited to gravity or sprinkler irrigation systems, although gravity systems require very short runs because of the soil's high water intake rate. Very gently sloping areas are suited to sprinkler systems. Sprinkler systems generally allow more uniform distribution of water at controlled rates. Water should be applied at close intervals during peak use periods because of the moderate available water capacity. Conservation tillage helps to control wind erosion.

This soil is suited to pasture and hay. Production can be improved or maintained and the soil protected from wind erosion by stocking at proper rates and by rotating grazing. Fertilizing and growing a mixture of grasses and legumes increase production.

Range vegetation controls wind erosion, but overgrazing reduces the protective cover and can allow severe erosion. Overgrazing also decreases the forage value of the vegetation. Proper grazing, deferred grazing, and use of a planned grazing system maintain or improve range condition.

This soil is suited to trees and shrubs for windbreaks. Trees and shrubs should be planted in shallow furrows with as little disturbance of the soil as possible. Strips of sod or a cover crop should be maintained between rows. Supplemental irrigation is needed to provide moisture during dry periods. Weeds and grasses can be controlled by cultivation or use of approved herbicides.

Septic tank absorption fields function well in this soil. Sewage lagoons may seep unless lined. The walls or sides of shallow excavations may slough or cave in unless shored. Damage to roads and streets by frost action can be reduced by providing good surface drainage. Crowning the road by grading and constructing adequate side ditches help to provide the needed surface drainage.

This soil is in capability units IIIe-5 dryland and IIIe-10 irrigated, Sandy range site, and windbreak suitability group 5.

An—Anselmo fine sandy loam, 0 to 2 percent slopes. This deep, nearly level, well drained soil is on uplands and stream terraces. It formed in loamy eolian material. Individual areas range from 10 to 200 acres in size.

Typically, the surface layer is grayish brown, very friable fine sandy loam about 7 inches thick. The subsurface layer is grayish brown, very friable fine sandy loam about 7 inches thick. The subsoil is pale brown, very friable fine sandy loam about 8 inches thick. The underlying material is light gray fine sandy loam to a depth of 60 inches. In some areas the surface layer is thinner.

Included with this soil in mapping are small areas of Gates, Dunday, and Valentine soils. Gates soils are in similar positions but have less sand throughout. Valentine and Dunday soils are slightly higher and have more sand throughout. Included areas make up 15 to 20 percent of this map unit.

Permeability is moderately rapid. Available water capacity is moderate. Runoff is slow. Tilth is good, and the soil is easily worked through a wide range of moisture conditions. Organic matter content is moderately low, and natural fertility is medium. Water intake rate is moderately high.

Most areas of this soil are farmed, and many areas are irrigated.

If dryfarmed, this soil is suited to corn, alfalfa, and small grains. Areas not adequately protected by growing crops or crop residue are subject to wind erosion. Leaving crop residue on the surface helps to prevent wind erosion and conserves moisture. Stripcropping, stubble-mulch tillage, and field windbreaks also help to control wind erosion. Returning crop residue and green manure crops to the soil maintains and improves organic matter content.

If irrigated, this soil is suited to corn, grain sorghum, and alfalfa. Wind erosion is a hazard but can be reduced by conservation tillage that leaves crop residue on the surface after planting. Gravity irrigation systems may require relatively short runs because of the soil's moderately high water intake rate. Deep cuts should be avoided in leveling for gravity systems because natural fertility may be less where cuts are made. This soil is well suited to most sprinkler systems. Sprinklers generally allow more uniform distribution of water and better control of the rate of application than gravity systems.

This soil is suited to pasture and hay. Production can be improved or maintained and the soil protected from wind by stocking at proper rates and rotating grazing. Fertilizing and growing a mixture of grasses and legumes increase production.

This soil is suited to range. Range vegetation controls wind erosion, but overgrazing reduces the protective cover and can allow severe wind erosion and creation of small blowouts. Overgrazing also decreases the forage value of the vegetation. Proper grazing, deferred grazing, and use of a planned grazing system maintain or improve range condition.

This soil is good for planting trees and shrubs for windbreaks. Wind erosion, lack of moisture, and competition from weeds and grasses are the main problems. Strips of sod or a cover crop between tree rows reduces wind erosion. Where water is available, supplemental irrigation during dry periods increases survival. Cultivation or use of approved herbicides controls weeds and grasses.

Septic tank absorption fields function well on this soil. Sewage lagoons may seep unless lined or sealed. The walls or sides of shallow excavations may slough or cave in unless shored. This soil is suited to dwellings. Damage to roads and streets by frost action can be

reduced by providing good surface drainage. Crowning the road by grading and constructing adequate side ditches help to provide the needed surface drainage.

This soil is in capability units IIe-3 dryland and IIe-8 irrigated, Sandy range site, and windbreak suitability group 5.

AnC—Anselmo fine sandy loam, 2 to 6 percent slopes. This deep, gently sloping, well drained soil is on uplands and stream terraces. It formed in loamy eolian material. Individual areas range from 10 to 200 acres in size.

Typically, the surface layer is grayish brown, friable fine sandy loam about 7 inches thick. The subsoil is light brownish gray, friable fine sandy loam about 10 inches thick. The underlying material is light gray fine sandy loam in the upper part and light brownish gray fine sandy loam in the lower part to a depth of 60 inches. In some places the surface layer is thinner and lighter in color and the underlying material is stratified with very fine sandy loam and loamy fine sand.

Included with this soil in mapping are areas of Cozad, Dunday, Gates, and Hersh soils. Cozad, Gates, and Hersh soils are in similar positions. Cozad and Gates soils have less sand throughout. Hersh soils have a lighter colored surface layer. Dunday soils are slightly less sloping and have more sand throughout. Inclusions make up 15 to 25 percent of this map unit.

Permeability is moderately rapid, and available water capacity is moderate. Runoff is medium. Organic matter content is moderately low, and natural fertility is medium. Water intake rate is moderately high.

Most of the acreage of this soil is farmed, and much is irrigated.

If dryfarmed, this soil is suited to corn, grain sorghum, wheat, and alfalfa. Wind and water erosion are the main concerns where the surface is not adequately protected by vegetation. Stripcropping, field windbreaks, stubble-mulch tillage, and leaving crop residue on the surface help to prevent wind erosion and conserve moisture. Terraces, contour farming, and conservation tillage control water erosion. Returning crop residue and green manure crops to the soil maintains or improves organic matter content and fertility.

If irrigated, this soil is suited to corn, grain sorghum, alfalfa, and grasses. Sprinkler irrigation systems are best because this soil is too sloping for gravity systems. Conservation tillage (such as till-plant, no-till, disk-and-plant) leaves crop residue on the surface and protects the soil from wind erosion. Terraces, contour farming, and conservation tillage reduce water erosion. Efficient use of irrigation water and uniform distribution of water are important.

This soil is suited to pasture and hay. Production can be improved or maintained and the soil protected from wind by stocking at proper rates and rotating grazing. Fertilizing and growing a mixture of grasses and legumes increase production.

Range vegetation controls wind and water erosion, but overgrazing or improper haying methods reduce the protective cover and increase erosion losses. Overgrazing also decreases the forage value of the vegetation. Proper grazing, deferred grazing, and use of a planned grazing system maintain or improve range condition.

This soil is suited to trees and shrubs for windbreaks. Adapted trees and shrubs survive and grow well if moisture is adequate, wind erosion is controlled, and competition from weeds and grasses is eliminated. Where water is available, irrigation can be used to supplement moisture during dry periods. Strips of sod between rows help to prevent wind erosion. Planting tree rows on the contour or terracing help to prevent water erosion. Cultivation or use of approved herbicides controls weeds and grasses.

Septic tank absorption fields function well in this soil. Sewage lagoons may seep unless sealed or lined. The walls or sides of shallow excavations may slough or cave in unless shored. Damage to roads and streets by frost action can be reduced by providing good surface drainage. Crowning the road by grading and constructing adequate side ditches help to provide the needed surface drainage. This soil is suited to dwellings. Small commercial buildings can be designed to fit the slope, or the soil can be graded to an acceptable slope.

This soil is in capability units IIIe-3 dryland and IIIe-8 irrigated, Sandy range site, and windbreak suitability group 5.

Ao—Anselmo very fine sandy loam, 0 to 1 percent slopes. This deep, nearly level, well drained soil is on stream terraces and uplands. It formed in loamy eolian material. Individual areas range from 10 to 150 acres.

Typically, the surface layer is dark gray, friable very fine sandy loam about 10 inches thick. The subsoil is 12 inches thick. It is light brownish gray, friable very fine sandy loam in the upper part and light brownish gray, very friable fine sandy loam in the lower part. The underlying material is light grayish brown and grayish brown, stratified fine sandy loam, very fine sandy loam, and loamy fine sand to a depth of 60 inches. In some places the surface layer is thinner.

Included with this soil in mapping are small areas of Cozad and Dunday soils. Cozad soils are in similar positions but have less sand in the subsoil. Dunday soils are slightly lower and have more sand in the upper part of the profile. Inclusions make up 15 to 25 percent of this map unit.

Permeability is moderately rapid, and available water capacity is moderate. Runoff is slow. Organic matter content is moderately low, and natural fertility is medium. Water intake rate is moderately high.

Most of the acreage of this soil is farmed, and many areas are irrigated.

If dryfarmed, this soil is suited to corn, grain sorghum, wheat, and alfalfa. Lack of moisture and wind erosion are the main concerns. Stripcropping, stubble-mulch tillage, and leaving crop residue on the surface help to prevent wind erosion and conserve moisture. Returning crop residue to the soil maintains or improves organic matter content and fertility.

If irrigated, this soil is suited to corn, grain sorghum, and alfalfa. It is suited to both gravity and sprinkler irrigation systems. Gravity systems require relatively short runs because of the soil's moderately high water intake rate and moderate available water capacity. Irrigation water should be distributed uniformly at controlled rates.

This soil is suited to pasture and hay. Production can be improved or maintained and the soil protected from wind by stocking at proper rates and rotating grazing. Fertilizing and growing a mixture of grasses and legumes increase production.

This soil is suited to range. Range vegetation controls wind erosion. Overgrazing reduces the protective cover and reduces the forage value of the vegetation. Proper grazing, deferred grazing, and use of a planned grazing system maintain or improve range condition.

This soil is suited to trees and shrubs for windbreaks. Wind erosion can be controlled by maintaining strips of sod or cover crops between the tree rows. Supplemental irrigation can provide moisture during dry periods while windbreaks are being established.

Septic tank absorption fields function well in this soil. Sewage lagoons may seep unless sealed or lined. The walls or sides of shallow excavations may slough or cave in unless shored. Damage to roads and streets by frost action can be reduced by providing good surface drainage. Crowning the road by grading and constructing adequate side ditches help to provide the needed surface drainage. This soil is suited to dwellings and small commercial buildings.

This soil is in capability units IIc-1 dryland and I-8 irrigated, Sandy range site, and windbreak suitability group 5.

AoB—Anselmo very fine sandy loam, 1 to 3 percent slopes. This deep, very gently sloping, well drained soil is on stream terraces and uplands. It formed in loamy eolian material. Individual areas range from 15 to 100 acres in size.

Typically, the surface layer is very friable very fine sandy loam about 16 inches thick. It is grayish brown in the upper part and dark gray in the lower part. The subsoil is grayish brown, friable fine sandy loam about 10 inches thick. The underlying material is pale brown fine sandy loam in the upper part and light yellowish brown loamy fine sand in the lower part to a depth of 60 inches. In some places the surface layer is thinner or is lighter in color or is fine sandy loam.

Included with this soil in mapping are small areas of Dunday and Cozad soils. Dunday soils are slightly lower and have more sand throughout. Cozad soils are in similar positions but have less sand in the subsoil. Inclusions make up 10 to 20 percent of the map unit.

Permeability is moderately rapid, and available water capacity is moderate. Organic matter content is moderately low, and natural fertility is medium. Water intake rate is moderately high.

Most of the acreage of this soil is farmed, and many areas are irrigated.

If dryfarmed, this soil is suited to corn, grain sorghum, wheat, and alfalfa. The principal concerns are wind and water erosion. Stripcropping, stubble-mulch tillage, field windbreaks, contour farming, and leaving crop residue on the surface help to prevent wind and water erosion and conserve moisture. Returning crop residue and green manure crops to the soil maintains organic matter content and fertility.

If irrigated, this soil is suited to corn, grain sorghum, and alfalfa. Conservation tillage (such as till-plant, no-till, disk-and-plant) leaves crop residue on the surface and protects the soil from wind and water erosion. Land leveling or contour bench leveling can establish a suitable grade for gravity irrigation. Severe cuts should be avoided in leveling because fertility may be less in cut areas. Gravity systems require relatively short runs because of the soil's moderately high water intake rate. The moderate available water capacity requires a relatively short time between water applications during peak use periods. Sprinkler systems are well suited to this soil and allow uniform application of water at desirable rates.

This soil is suited to pasture and hay. Production can be improved or maintained and the soil protected from wind by stocking at proper rates and rotating grazing. Fertilizing and growing a mixture of grasses and legumes increase production.

Range vegetation controls wind and water erosion. Overgrazing reduces the protective cover and decreases the forage value of the vegetation. Proper grazing and deferred grazing maintain or improve range condition.

This soil is suited to trees and shrubs for windbreaks. Adapted species survive and grow well if moisture is adequate, wind erosion is controlled, and competition from weeds and grasses is eliminated. Where water is available, irrigation can be used to supplement moisture during dry periods. Strips of sod between rows help to prevent wind erosion. Cultivation or use of approved herbicides controls weeds and grasses in tree rows.

Septic tank absorption fields function well in this soil. Sewage lagoons may seep unless sealed or lined. The walls or sides of shallow excavations may slough or cave in unless shored. Damage to roads and streets by frost action can be reduced by providing good surface

drainage. Crowning the road by grading and constructing adequate side ditches help to provide the needed surface drainage. This soil is suited to dwellings and small commercial buildings.

This soil is in capability units IIe-1 dryland and IIe-8 irrigated, Sandy range site, and windbreak suitability group 5.

Ba—Barney fine sandy loam, 0 to 2 percent slopes. This deep, poorly drained, nearly level soil is on bottom lands. It formed in sandy and loamy alluvium. It is frequently flooded for long periods. Individual areas are generally long and narrow and are adjacent to river channels or abandoned channels. The areas are commonly intersected by small channels or drainageways. Areas range from 10 to 100 acres in size.

Typically, the surface layer is very dark grayish brown, very friable, stratified, calcareous fine sandy loam about 7 inches thick. The stratified underlying material is very pale brown and light gray, mottled fine sand in the upper part and very pale brown sand in the lower part to a depth of 60 inches. In some areas the surface layer is loam or loamy fine sand and is thinner or lighter in color. Some small areas are ponded during much of the growing season.

Included with this soil in mapping are small areas of Boel, Gannett, and Loup soils. Boel, Gannett, and Loup soils are in slightly higher positions. Boel soils are better drained. Gannett soils are finer textured between depths of 10 and 40 inches. Loup soils have a thicker dark surface layer. Inclusions make up 5 to 15 percent of this map unit.

Permeability is moderately rapid in the surface layer and rapid in the underlying fine sand and sand. Available water capacity is low. Runoff is very slow. The seasonal high water table is between the surface and a depth of 2 feet. The water table is highest in spring when stream flow is at the highest level. Organic matter content is moderately low, and natural fertility is medium.

Nearly all areas of this soil are in native vegetation. They are used as range or are left idle and used for wildlife habitat.

This soil is unsuitable for dryfarmed or irrigated crops or pasture because of the seasonal high water table and frequent flooding.

This soil is suited to range and can be very productive if managed well. Overgrazing may cause a decrease in most desirable native plants and an increase in less desirable species. Grazing when the soil is wet causes surface compaction and roughness or mounding. The grasses are not usually cut for hay because the meandering stream channels interfere with equipment use, the soil is excessively wet, and trees and shrubs are common. The common flowing streams provide water for livestock. Livestock could be endangered by floods, mainly in early spring during periods of high stream flow.

This soil is not suitable for trees and shrubs for windbreaks because of the seasonal high water table and frequent flooding. Species that tolerate wetness can be planted for wildlife habitat.

This soil is generally unsuitable for buildings and sanitary facilities because of wetness and flooding. More suitable soils are usually nearby.

This soil is in capability unit Vw-7 dryland, Wetland range site, and windbreak suitability group 10.

Bn—Barney Variant loam, 0 to 1 percent slopes. This deep, nearly level, very poorly drained soil is on bottom lands. It formed in sandy and loamy alluvium. Most areas are in abandoned stream channels along major rivers. This soil is frequently flooded and ponded with surface water for long periods. Individual areas range from 5 to 100 acres in size.

Typically, the surface layer is gray, friable loam about 14 inches thick. The underlying material is gray, stratified very fine sandy loam in the upper part; light gray, stratified fine sand in the middle part; and gray, stratified very fine sandy loam in the lower part to a depth of 60 inches. The soil is calcareous throughout. Some areas lack fine sand in the underlying material.

Included with this soil in mapping are small areas of poorly drained Barney and Gannett soils, which are in slightly higher positions. These areas make up 2 to 10 percent of the map unit.

Permeability is moderately rapid. Available water capacity is moderate. Runoff is very slow or ponded. The seasonal high water table ranges from 0.5 feet above the surface to 1 foot below the surface. Organic matter content is moderate. Natural fertility is medium.

All of the acreage of this soil is in native vegetation and is used for wildlife habitat. The vegetation consists mainly of rushes, cattails, reeds, and willows.

This soil is unsuitable for cultivated crops, range, and trees for windbreaks. This soil is suited to wetland wildlife habitat, mainly for waterfowl.

This soil is generally unsuitable for buildings and sanitary facilities because of wetness and flooding. More suitable soils are usually nearby.

This soil is in capability unit VIIIw-7 and windbreak suitability group 10.

Bo—Boel loamy fine sand, 0 to 2 percent slopes. This deep, somewhat poorly drained, nearly level soil is on bottom lands. It formed in sandy alluvium. This soil is occasionally flooded for brief periods. Individual areas are long and narrow and are adjacent to stream and river channels. Individual areas range from 10 to 80 acres in size.

Typically, the surface layer is dark grayish brown, very friable, calcareous loamy fine sand about 10 inches thick. The next 6 inches is grayish brown, calcareous loamy fine sand. The mottled underlying material is light brownish gray fine sand in the upper part and white fine

sand in the lower part to a depth of 60 inches. Some areas have a fine sandy loam or very fine sandy loam surface layer. The surface layer is also lighter in color and thinner in some areas.

Included with this soil in mapping are small areas of Barney, Gannett, and Loup soils. Barney, Gannett, and Loup soils are poorly drained and are in slightly lower positions. Inclusions make up 10 percent of the map unit.

Permeability is rapid. Available water capacity is low. Runoff is very slow. The seasonal high water table is 1.5 feet deep in wet years to 3.5 feet deep in dry years. Organic matter content is moderately low, and natural fertility is medium. Water intake rate under irrigation is very high.

Most areas of this soil are rangeland used for grazing or hay. Some areas are cultivated and grow corn and alfalfa.

If dryfarmed, this soil is poorly suited to corn, grain sorghum, wheat, and alfalfa. Wetness is the main limitation and may delay tillage in early spring. Tile or ditches will lower the water table if suitable outlets are available. There is a hazard of wind erosion during dry periods. Conservation tillage that leaves crop residue on the surface helps to prevent wind erosion and conserve moisture.

This soil is poorly suited to corn, grain sorghum, and alfalfa under sprinkler irrigation. It is not suited to gravity irrigation because of the very high water intake rate. Wetness is the main limitation and may delay tillage in spring. Tile or ditches will lower the water table if suitable outlets are available. Because of the low available water capacity and rapid permeability, irrigation water and fertilizer must be applied more frequently than on finer soils. If the soil surface is not protected, there is a hazard of wind erosion during dry periods. Conservation tillage that leaves crop residue on the surface helps to prevent wind erosion and conserve moisture.

This soil is suited to pasture and hay. Wetness and flooding are problems. Grazing or haying should be delayed until the soil surface is firm and grass has reached minimum height. Silt or sand deposited by floods may damage grasses. Production can be improved or maintained by stocking at proper rates and rotating grazing. Introduced grasses respond to fertilizer and irrigation. Production can be increased by growing a mixture of grasses and legumes.

Range vegetation controls wind erosion. Overgrazing reduces the protective cover and decreases the forage value of the vegetation. Proper grazing and deferred grazing maintain the plant community in good condition.

This soil is fair for planting trees and shrubs for windbreaks. Species that tolerate occasional wetness survive and grow well. Wind erosion is a hazard to new seedlings. A cover crop between the rows of trees helps to control wind erosion.

This soil is generally unsuitable for buildings and sanitary facilities because of wetness and flooding. More suitable soils are usually nearby. Constructing roads on suitable, well compacted fill material above the flood level and providing adequate side ditches and culverts help to protect roads from flood damage and wetness.

This soil is in capability units IVw-5 dryland and IVw-11 irrigated, Subirrigated range site, and windbreak suitability group 2S.

Bp—Boel fine sandy loam, 0 to 2 percent slopes. This deep, somewhat poorly drained, nearly level soil is on bottom lands. It formed in sandy alluvium. This soil is occasionally flooded for brief periods. Individual areas are long and narrow and are adjacent to streams and river channels. Areas range from 10 to 80 acres in size.

Typically, the surface layer is dark grayish brown, friable fine sandy loam about 10 inches thick. The next 4 inches is grayish brown, fine sandy loam. The underlying material is 4 inches of light brownish gray, fine sandy loam over white fine sand to a depth of 60 inches. In some areas the surface layer is lighter in color or is loamy fine sand or very fine sandy loam.

Included with this soil in mapping are small areas of Barney, Gannett, and Loup soils. Barney, Gannett, and Loup soils are poorly drained and are in slightly lower positions. Inclusions make up 10 percent of the map unit.

Permeability is rapid. Available water capacity is low. Runoff is very slow. The seasonal high water table is 1.5 feet deep in wet years to 3.5 feet deep in dry years. Organic matter content is moderately low, and natural fertility is medium. Water intake rate is moderately high.

Most areas of this soil are rangeland used for grazing.

If dryfarmed, this soil is suited to corn, grain sorghum, wheat, and alfalfa. Wetness when the water table is high is the main limitation and may delay wetness in early spring. Tile or ditches will lower the water table if suitable outlets are available. Wind erosion is also a hazard during dry periods if the soil surface is not adequately protected by growing crops or residue. Leaving crop residue on the surface helps to prevent wind erosion.

This soil is suited to corn, grain sorhgum, and alfalfa under sprinkler irrigation. Wetness is the main limitation and may delay tillage in early spring. Tile or ditches will lower the water table if suitable outlets are available. Because of the coarse texture of the underlying material and the low available water capacity, this soil requires frequent, light applications of irrigation water and fertilizer. Wind erosion during dry periods can be controlled by conservation tillage that leaves crop residue on the surface.

This soil is suited to pasture and hay. Wetness and flooding are problems. Grazing or haying should be delayed until the soil surface is firm and grass has reached minimum height. Silt or sand deposited by

floods may damage grasses. Production can be improved or maintained by stocking at proper rates and rotating grazing. Introduced grasses respond to fertilizer and irrigation. Production can be increased by growing a mixture of grasses and legumes.

Range vegetation controls wind erosion. Overgrazing reduces the protective cover and decreases the forage value of the vegetation. Proper grazing and deferred grazing maintain the plant community in good condition.

This soil is fair for planting trees and shrubs for windbreaks. Species that tolerate occasional wetness survive and grow well. Wind erosion is a hazard to new seedlings. A cover crop between the rows of trees helps to control wind erosion.

This soil is not suitable for building sites or septic tank absorption fields because of the hazards of flooding and wetness. Because of the rapid permeability of the underlying material, this soil does not adequately filter effluent from waste disposal systems. Seepage from septic tank absorption fields and sewage lagoons can contaminate the underground water supply; therefore, other sites on suitable soils should be found. Constructing roads on suitable well compacted fill material above the flood level and providing adequate side ditches and culverts help to protect roads from flood damage and wetness.

This soil is in capability units IIIw-4 dryland and IIIw-8 irrigated, Subirrigated range site, and windbreak suitability group 2S.

BxB—Boel soils, channeled, 0 to 3 percent slopes. These deep, nearly level and very gently sloping, somewhat poorly drained soils are on bottom lands. They formed in sandy alluvium. They are frequently flooded. Individual areas are long and narrow and follow the stream channels. The areas are intersected by meandering stream channels. Areas range from 20 acres to several hundred acres in size.

Typically, the surface layer is grayish brown, loose loamy fine sand about 10 inches thick. The next 3 inches is light brownish gray fine sand. The underlying material is light gray fine sand to a depth of 60 inches. In some areas the surface layer is fine sand or fine sandy loam. In places the surface is lighter in color and thinner.

Included with these soils in mapping are areas of Barney, Cass, and Inavale soils. Barney soils are poorly drained and are in slightly lower positions. Cass and Inavale soils are better drained and are higher. Inclusions make up 15 to 35 percent of this map unit.

Permeability is rapid. Available water capacity is low. Runoff is slow. The seasonal high water table is between depths of 1.5 feet in wet years and 3.5 feet in dry years. Organic matter content is moderately low, and natural fertility is medium.

Most of the acreage of these soils is in native grass, trees, and shrubs. This soil is used for wildlife habitat.

This mapping unit is not suitable for cultivated crops, pasture, hay, or trees or shrubs for windbreaks. It has limited value for range.

This soil is not suitable for building sites or sanitary facilities because of the frequent flooding and wetness; other sites should be found. Seepage from septic tank absorption fields and sewage lagoons can contaminate the underground water supply. Constructing roads on suitable, well compacted fill material above the flood level and providing adequate side ditches and culverts help to protect roads from damage and wetness.

These soils are in capability unit Vw-7 and windbreak suitability group 10.

Ca—Cass fine sandy loam, 0 to 2 percent slopes. This deep, nearly level, well drained soil is on bottom lands of major streams. This soil formed in mixed loamy and sandy alluvium. The soil is rarely flooded. Individual areas are irregular in shape and range from 10 to 50 acres in size.

Typically, the surface layer is grayish brown, very friable fine sandy loam about 15 inches thick. The next 4 inches is light brownish gray, very friable fine sandy loam. The underlying material is light gray fine sandy loam in the upper part and fine sand in the lower part to a depth of 60 inches.

Included with this soil in mapping are small areas of Boel and Inavale soils. Boel soils are lower and are somewhat poorly drained. Inavale soils have more sand throughout. Inclusions make up 10 to 15 percent of this map unit.

Permeability is moderately rapid, and available water capacity is moderate. Surface runoff is slow. Tilth is good through a wide range of moisture conditions. Organic matter content is moderately low, and natural fertility is medium. Water intake rate is moderately high.

Most of the acreage of this soil is farmed.

If dryfarmed, this soil is suited to corn, grain sorghum, wheat, and alfalfa. The main hazard is wind erosion. Leaving crop residue on the surface helps to prevent wind erosion and conserves moisture. Deep-rooted crops such as alfalfa may receive additional moisture from the water table, which is 6 to 15 feet below the surface in most areas.

If irrigated, this soil is suited to corn, grain sorghum, and alfalfa. The main hazard is wind erosion. Leaving crop residue on the surface helps to prevent wind erosion and conserves moisture. Gravity irrigation systems require relatively short runs because of the soil's moderately high water intake rate and moderate available water capacity, and frequent, light applications of water and fertilizer needed to prevent leaching. Sprinkler irrigation systems distribute water uniformly at controlled rates.

This soil is suited to pasture and hay. Production can be improved or maintained and the soil can be protected from wind erosion by stocking at proper rates, rotating

grazing, and fertilizing. Production can also be increased by growing a mixture of grasses and legumes.

Range vegetation controls wind erosion. Overgrazing reduces the protective cover and decreases the forage value of the vegetation. Proper grazing and deferred grazing or haying maintain the plant community in good condition.

This soil is good for planting trees and shrubs for windbreaks. Wind erosion and droughtiness caused by competition from weeds and grasses are the main concerns. Strips of sod or a cover crop between tree rows reduce erosion. If water is available, supplemental irrigation during dry periods can increase survival. Cultivation or use of approved herbicides controls weeds and grasses.

Septic tank absorption fields may need to be protected from the rare flooding. Other sites should be found for sewage lagoons to avoid the flooding and problems caused by seepage. Other sites should be found for dwellings to avoid the flooding. Damage to roads can be reduced by providing good surface drainage. Crowning the road by grading or constructing adequate side ditches and culverts helps to provide the needed surface drainage. Constructing roads and streets of suitable fill and providing adequate side ditches help to protect them from flooding.

This soil is in capability units IIe-3 dryland and IIe-8 irrigated, Sandy Lowland range site, and windbreak suitability group 1.

CoD2—Coly-Uly silt loams, 6 to 11 percent slopes, eroded. These deep, strongly sloping, well drained soils are on narrow ridges and upper parts of side slopes on uplands. They formed in loess. Much of the original surface layer has been removed by erosion. The Coly soil commonly makes up 45 to 55 percent of the map unit, and the Uly soil makes up 25 to 35 percent. The Coly soil is on the higher parts of the landscape, and the Uly soil is usually on the side slopes. These soil occur in a complex pattern, and separating them is not practical at the scale of mapping. Individual areas of this complex range from 10 to 200 acres in size.

Typically, the surface layer of the Coly soil is light brownish gray, friable, calcareous silt loam about 6 inches thick. The underlying material is light gray, calcareous silt loam to a depth of 60 inches.

Typically, the surface layer of the Uly soil is dark brown, friable silt loam about 6 inches thick. The subsoil is silt loam 13 inches thick. It is dark brown in the upper part, dark grayish brown in the middle part, and grayish brown in the lower part. The underlying material is light gray, calcareous silt loam to a depth of 60 inches.

Included with these soils in mapping are small areas of Holdrege soils. Holdrege soils have more clay in the subsoil. Inclusions make up 5 to 15 percent of the map unit.

Permeability is moderate and available water capacity is high in both soils. Runoff is medium. Organic matter content is very low in the Coly soil and moderately low in the Uly soil. The Coly soil is calcareous throughout. Water intake rate is moderate in both soils.

Most of the acreage of this complex is farmed. Some areas have been reseeded to grasses and are used for range or pasture.

If dryfarmed, these soils are poorly suited to corn, grain sorghum, wheat, and alfalfa. Water erosion is the principal hazard. Terracing, contour farming, stubble-mulch tillage, and leaving crop residue on the surface reduce erosion. Returning crop residue and green manure crops to the soil improves organic matter content and fertility.

These soils are poorly suited to sprinkler irrigation and unsuited to gravity irrigation. Water erosion is the main hazard. Terraces, contour farming, and conservation tillage that leaves crop residue on the surface help to reduce erosion. Close-grown crops, such as alfalfa and grasses, also protect the soil from erosion. Returning crop residue to the soil improves organic matter content and fertility. Where center-pivot irrigation systems are used, wheel tracks may erode and form small gullies. Adjusting the water application rate to the soil's moderate water intake rate permits most of the water to be absorbed and reduces runoff.

These soils are suited to pasture and hay. Water erosion is a problem but can be controlled by such conservation practices as terraces and maintaining adequate cover on the surface. Production can be improved or maintained by stocking at proper rates and rotating grazing. Introduced grasses respond to fertilizer and sprinkler irrigation. Irrigation water applications should not exceed the soil's intake rate. Grazing should be delayed in spring and after irrigation until the surface is firm and grass has reached minimum height. Growing a mixture of grasses and legumes increases production.

Range vegetation controls water erosion, but overgrazing reduces the protective cover and can allow severe gullying. Overgrazing also decreases the forage value of the vegetation. Proper grazing, deferred grazing, and use of a planned grazing system maintain or improve range condition.

These soils are only fair for planting trees and shrubs for windbreaks. Water erosion, droughtiness, and competition from weeds and grasses are the principal problems. Planting trees on the contour and terracing conserve moisture. Cultivation or use of approved herbicides controls weeds. Strips of sod or cover crops between rows reduce erosion. Where water is available, irrigation can be used to supplement moisture during dry periods.

For septic tank absorption fields to operate satisfactorily, slope has to be modified or lines have to be installed on the contour. Slope also has to be modified for sewage lagoons. Seepage from sewage

lagoons can be reduced by lining them with less permeable material or sealing them with chemicals. Dwellings and small commercial buildings need to be designed to fit the slope, or the soil can be graded to an acceptable slope. The surface material and base material of roads must be thick enough to overcome the low strength of the soil. Using coarser grained base material improves performance of paved roads. Providing a waterproof surface and good surface drainage reduces damage to local roads and streets from frost action.

These soils are in capability units IVe-9 dryland and IVe-6 irrigated. The Coly soil is in Limy Upland range site and windbreak suitability group 8. The Uly soil is in Silty range site and windbreak suitability group 3.

CoF2—Coly-Uly silt loams, 11 to 20 percent slopes, eroded. These deep, moderately steep and steep, somewhat excessively drained soils are on side slopes and narrow ridgetops on uplands. They formed in loess. Much of the original surface layer has been removed by erosion. The Coly soil commonly makes up 45 to 60 percent of the map unit, and the Uly soil makes up 20 to 40 percent. The Coly soil is commonly on the higher, narrow ridgetops, and the Uly soil is on the side slopes. These soils occur in a complex pattern, and separating them is not practical at the scale of mapping. Individual areas of this complex range from 10 to 300 acres in size.

Typically, the surface layer of the Coly soil is light brownish gray, friable, calcareous silt loam about 6 inches thick. The underlying material is light gray, calcareous silt loam to a depth of 60 inches.

Typically, the surface layer of the Uly soil is dark brown, friable silt loam about 6 inches thick. The subsoil is dark brown silt loam 8 inches thick. The underlying material is very pale brown, calcareous silt loam to a depth of 60 inches. In some places the surface layer is thinner and lighter in color.

Included with these soils in mapping are small areas of Holdrege soils. Holdrege soils have more clay in the subsoil and generally are on the lower parts of the side slopes. Inclusions make up 5 to 15 percent of the map unit.

Permeability is moderate and available water capacity is high in both soils. Runoff is medium. Organic matter content is very low in the Coly soil and moderately low in the Uly soil. The Coly soil is calcareous throughout. Water intake rate is moderate in both soils.

Most of the acreage of this complex is range. Some areas are farmed or are in pasture.

These soils are generally not suited to dryland or irrigated crops or pasture because of the very severe hazard of water erosion. Where these soils are being farmed, alternatives such as reseeding native grasses should be considered to reduce water erosion.

Range vegetation controls water erosion, but overgrazing reduces the protective cover and can result in formation of gullies and severe soil loss. Overgrazing also decreases the forage value of the vegetation. Proper grazing, deferred grazing, and use of a planned grazing system maintain or improve range condition.

These soils are poorly suited to trees and shrubs for windbreaks because of the moderately steep and steep slope and the very severe erosion hazard. Planting trees on the contour and terracing help to prevent erosion and excessive runoff. Species that tolerate excessive carbonates should be selected.

These soils are not suitable for septic tank absorption fields, sewage lagoons, and dwellings because of the moderately steep and steep slope; other sites should be found. For the soil to be used for these purposes, the slope would have to be modified and sewage lagoons would have to be sealed to prevent seepage. Dwellings and small commercial buildings would have to be designed to fit the slope. The surface material and base material of roads have to be thick enough to overcome the low strength of the soil. Using coarser grained base material improves performance of paved roads. Providing a waterproof surface and good surface drainage reduces the damage to local roads and streets from frost action.

These soils are in capability unit VIe-9 dryland. The Coly soil is in Limy Upland range site and windbreak suitability group 8. The Uly soil is in Silty range site and windbreak suitability group 3.

CrG—Coly-Hobbs silt loams, 2 to 60 percent slopes. These deep, very gently sloping to very steep, moderately permeable soils are on deeply dissected uplands (fig. 7). The Coly soil is somewhat excessively drained and excessively drained, and the Hobbs soil is well drained. The Coly soil formed in calcareous loess. The Hobbs soil formed in alluvium and is occasionally flooded. The Coly soil makes up 65 to 75 percent of this map unit, and the Hobbs soil makes up about 20 percent. The Coly soil is on canyon sides and on narrow ridges between the canyons. These canyon sides commonly have a succession of short vertical exposures called "catsteps" which expose the parent loess. The Hobbs soil is on very gently sloping, narrow bottom lands below the canyon sides. The Hobbs soil is occasionally flooded for brief periods. Areas of these soils are so small or so narrow that separating them in mapping is not practical. Individual areas of this complex range from 15 acres to several hundred acres in size.

Typically, the surface layer of the Coly soil is grayish brown, friable silt loam about 4 inches thick. The next 6 inches is pale brown, friable, calcareous silt loam. The underlying material is very pale brown, calcareous silt loam to a depth of 60 inches. In some places the surface layer is overblown with a few inches of more recent silt or sand. In many places older geologic materials, such as reddish brown loess, have been exposed on the lower parts of canyon sides.

Typically, the surface layer of the Hobbs soil is grayish brown, friable, stratified silt loam about 8 inches thick.

Figure 7.—Area of Coly-Hobbs silt loams, 2 to 60 percent slopes. The Coly soil is on very steep side slopes and the Hobbs soil is on nearly level bottom lands.

The underlying material is light brownish gray and grayish brown, stratified silt loam in the upper part and pale brown, stratified silt loam in the lower part to a depth of 60 inches. In some areas this soil contains more sand than is typical for Hobbs soils. Some areas are calcareous in part or all of the profile.

Included with these soils in mapping are small areas of Uly soils. Uly soils are on broader ridges between canyons and less sloping side slopes. Uly soils have a darker and thicker surface layer, have a weakly developed subsoil, and are calcareous at a greater depth. Inclusions make up 5 to 15 percent of the map unit.

Permeability is moderate in both soils. Available water capacity is high. Runoff is very rapid on the Coly soil and medium on the Hobbs soil. The Coly soil has moderately low organic matter content and low natural fertility. The Hobbs soil has moderate organic matter content and high natural fertility. The Coly soil is calcareous at or near the surface and throughout the profile.

All of the acreage of this complex is in native grass, and most is used for grazing. These soils also provide habitat for many kinds of wildlife common in Custer County.

These soils are unsuitable for dryfarmed or irrigated crops, pasture, or hay.

These soils are suited to range. Livestock tend to overgraze the easily accessible, gently sloping Hobbs soil and the narrow ridges between the canyons and leave the very steep Coly part idle. In most areas overgrazing of the Hobbs soil and the narrow ridges has reduced the forage value of the vegetation. Proper grazing, deferred grazing, and use of a planned grazing system maintain or improve range condition. Severe water erosion is a concern on the Coly soil. Gullies may form if livestock continuously take the same path on steep slopes to water and salt facilities. Carefully locating an adequate number of water and salt facilities may help to eliminate this problem and can help to distribute livestock for more uniform grazing.

These soils are unsuitable for trees and shrubs for windbreaks. However, trees and shrubs may be hand planted for wildlife habitat.

These soils are well suited to habitat for such wildlife as pheasant, quail, prairie chicken, grouse, rabbit, coyote, and deer. They provide both food and good cover for these animals.

These soils are unsuitable for septic tank absorption fields or sewage lagoons because of the very steep slope of the Coly soil and flooding on the Hobbs soil. Other sites should be found for dwellings because of the excessive slope. These soils are poorly suited to local roads because of the very steep slope of the Coly soil and occasional flooding on the Hobbs soil. Extensive grading and earth moving would be required for roads. In many areas, roads are simply routed around these soils to avoid construction problems. Also, the surface material and base material of roads would have to be thick enough to overcome the low strength of the soils. Using coarser grained base material improves performance of paved roads.

These soils are in capability unit VIIe-9 dryland and windbreak suitability group 10. The Coly soil is in Thin Loess range site, and the Hobbs soil is in Silty Overflow range site.

Cs—Cozad silt loam, 0 to 1 percent slopes. This deep, well drained, nearly level soil is in valleys. It formed in colluvial and alluvial material from the adjacent loess uplands. Individual areas range from 10 to 200 acres in size.

Typically, the surface layer is grayish brown, friable silt loam about 12 inches thick. The subsoil is light brownish gray, friable silt loam about 10 inches thick. The underlying material is 28 inches of stratified, light gray very fine sandy loam. Below this is a grayish brown very fine sandy loam buried surface layer to a depth of 60 inches. In some areas the surface layer has been altered by land leveling operations. Buried soils are common. In some areas the surface layer and subsoil are very fine sandy loam.

Included with this soil in mapping are small areas of Hord and Hall soils, commonly in slightly lower positions. Hord and Hall soils have dark colors extending below a depth of 20 inches. Hall soils have more clay in the subsoil. These inclusions make up 10 to 20 percent of the map unit.

Permeability is moderate. Available water capacity is high. Runoff is slow. Organic matter content is moderate, and natural fertility is high. The water intake rate under irrigation is moderate.

Most of the acreage of this soil is farmed and irrigated.

If dryfarmed, this soil is suited to commonly grown crops, such as corn, grain sorghum, wheat, and alfalfa. Wind erosion is a hazard during periods of limited rainfall if the soil surface is not protected by vegetation or crop residue. Conservation tillage practices, such as minimum tillage, help to conserve moisture and protect the soil from wind erosion.

If irrigated, this soil is suited to corn, grain sorghum, and alfalfa. Conservation tillage helps to control wind erosion and conserve moisture. This soil is suited to both gravity and sprinkler irrigation systems. Land leveling establishes a suitable grade for gravity systems. Efficient water use is important.

This soil is suited to pasture and hay. Production can be improved or maintained by stocking at proper rates and rotating grazing. Introduced grasses respond to fertilizer and irrigation. Grazing should be delayed in spring and after irrigation until the soil surface is firm and grass has reached minimum height. Production can be increased by growing a mixture of grasses and legumes.

This soil is suited to trees and shrubs for windbreaks. Seedlings generally survive and grow if competing vegetation is controlled or removed by good site preparation and timely cultivation between tree rows or use of approved herbicides.

Septic tank absorption fields function well in this soil. Sewage lagoons may seep unless sealed or lined. This soil is suited to dwellings and small commercial buildings. Damage to roads and streets by frost action can be reduced by providing good surface drainage. Crowning the road by grading and constructing adequate side ditches help to provide the needed surface drainage.

This soil is in capability units IIc-1 dryland and I-6 irrigated, Silty range site, and windbreak suitability group 3.

CsC—Cozad silt loam, 3 to 6 percent slopes. This deep, well drained, gently sloping soil is on foot slopes. It formed in colluvial and alluvial material. Individual areas range from 10 to 80 acres in size.

Typically, the surface layer is gray, friable silt loam about 8 inches thick. The subsoil is about 11 inches thick. It is grayish brown silt loam in the upper part and light brownish gray silt loam in the lower part. The underlying material is light gray, stratified very fine sandy loam to a depth of 60 inches. In some areas the surface layer and subsoil are very fine sandy loam. In places, the

surface layer is thinner and lighter in color. Buried soils are common below a depth of 40 inches.

Included with this soil in mapping are small areas of Hord and Holdrege soils. Hord soils have dark colors extending below a depth of 20 inches. Holdrege soils have more clay in the subsoil and formed in loess. These inclusions make up to 10 to 20 percent of the map unit.

Permeability is moderate, and available water capacity is high. Runoff is moderate. Organic matter content is moderate, and natural fertility is high. Water intake rate is moderate.

Most of the acreage of this soil is dryfarmed. Some areas are irrigated.

If dryfarmed, this soil is suited to corn, grain sorghum, wheat, and alfalfa. Water erosion is a hazard. Conservation practices, such as terracing, contour farming, stubble mulching, and minimum tillage, reduce erosion. Returning crop residue to the soil maintains or improves organic matter content and fertility.

If sprinkler irrigated this soil is suited to corn, grain sorghum, and alfalfa and grasses for hay or pasture. This soil is not suited to gravity irrigation systems unless the slope can be reduced by land leveling or bench leveling. Water erosion is reduced by such practices as terracing, contour farming, and growing close-grown crops like alfalfa and grasses for hay or pasture. Efficiently using water and controlling runoff are important. Returning crop residue to the soil maintains or improves organic matter content and fertility.

This soil is suited to pasture and hay. Water erosion can be controlled by terraces and by maintaining adequate cover on the surface. Production is improved or maintained by stocking at proper rates and rotating grazing. Introduced grasses respond to fertilizer and sprinkler irrigation. Carefully controlled applications of irrigation water increase effective use of water and reduce the erosion hazard. Growing a mixture of grasses and legumes increases production.

Range vegetation controls erosion, but overgrazing reduces the protective cover and can allow water erosion. Overgrazing also can reduce the forage value of the vegetation. Proper grazing and deferred grazing or haying maintain or improve range condition.

This soil is suited to trees and shrubs for windbreaks. Seedlings generally survive and grow if competing vegetation is controlled or removed by good site preparation and timely cultivation between tree rows or use of approved herbicides.

Septic tank absorption fields function well in this soil. Sewage lagoons may seep unless sealed or lined. The surface of the soil may have to be shaped or graded for sewage lagoons and dwellings. Dwellings can be designed to fit the slope. If the site is used for buildings, water from higher areas should be kept off this soil by diversions or other methods. Damage to roads and streets by frost action can be reduced by providing good surface drainage. Crowning the road by grading and constructing adequate side ditches help to provide the needed surface drainage.

This soil is in capability units IIIe-1 dryland and IIIe-6 irrigated, Silty range site, and windbreak suitability group 3.

Cz—Cozad silt loam, terrace, 0 to 1 percent slopes. This deep, well drained, nearly level soil is on stream terraces. It formed in colluvium and alluvium washed from loess uplands. Flooding is rare. Individual areas range from 10 to 600 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 8 inches thick. The subsurface layer is dark grayish brown, friable silt loam about 4 inches thick. The subsoil is grayish brown, friable silt loam about 10 inches thick. The underlying material is light brownish gray, stratified very fine sandy loam to a depth of 60 inches. In some areas the surface layer has been altered by land leveling operations. Buried soils are common. In some places the surface layer is very fine sandy loam.

Included with this soil in mapping in slightly lower positions are small areas of Hord, Hall, and Rusco soils. Hord and Hall soils have dark colors extending below a depth of 20 inches. Hall and Rusco soils have more clay in the subsoil. Rusco soils are moderately well drained. These inclusions make up 5 to 15 percent of the map unit.

Permeability is moderate. Available water capacity is high. Runoff is slow. Organic matter content is moderate, and natural fertility is high. Water intake rate under irrigation is moderate.

Most of the acreage of this soil is farmed and irrigated. Some is dryfarmed.

If dryfarmed, this soil is suited to corn, grain sorghum, wheat, and alfalfa. Alfalfa may receive additional moisture from the water table, which is more than 6 feet below the surface. Wind erosion is a hazard if the soil surface is not protected by vegetation or crop residue. Conservation tillage, such as minimum tillage, helps to conserve moisture and protect the soil from wind erosion.

If irrigated, this soil is suited to corn, grain sorghum, and alfalfa. Conservation tillage helps to control wind erosion and conserves moisture. This soil is suited to both gravity and sprinkler irrigation systems. Land leveling establishes a suitable grade for gravity systems. Efficiently using water and controlling runoff are important.

This soil is suited to pasture and hay. Production is improved or maintained by stocking at proper rates, rotating grazing, and growing a mixture of grasses and legumes. Introduced grasses respond to fertilizer and irrigation. Grazing should be delayed in spring and after

irrigation until the soil surface is firm and grass has reached minimum height.

This soil is suited to trees and shrubs for windbreaks. Seedlings generally survive and grow if competing vegetation is controlled or removed by good site preparation and timely cultivation between tree rows or use of approved herbicides. Irrigation can supplement moisture in dry periods while windbreaks are being established.

Septic tank absorption fields function well if protected from flooding. Sewage lagoons need dikes as protection from flooding and should be sealed or lined to prevent seepage. Buildings can be constructed on elevated, well compacted fill above the flood level. Constructing roads on suitable, well compacted fill above the flood level and providing adequate side ditches and culverts help to protect roads from flood damage. Damage to roads by frost action can be reduced by providing good surface drainage. Grading and constructing adequate side ditches help to provide the needed surface drainage.

This soil is in capability units IIc-1 dryland and I-6 irrigated, Silty Lowland range site, and windbreak suitability group 1.

CzB—Cozad silt loam, terrace, 1 to 3 percent slopes. This deep, well drained, very gently sloping soil is on stream terraces. It formed in colluvium and alluvium from loess uplands. Flooding is rare. Individual areas range from 10 to 200 acres in size.

Typically, the surface layer is gray, friable silt loam about 9 inches thick. The subsoil is about 14 inches thick. It is grayish brown silt loam in the upper part and light brownish gray silt loam in the lower part. The underlying material is light gray very fine sandy loam to a depth of 60 inches. In some areas the surface layer has been altered by land leveling operations. Buried soils are common. In some areas the surface layer and subsoil are very fine sandy loam.

Included with this soil in mapping in slightly lower positions are smaller areas of Hord and Hall soils. Hord and Hall soils have dark colors extending below a depth of 20 inches. Hall soils have more clay in the subsoil. These inclusions make up 10 to 20 percent of the map unit.

Permeability is moderate. Available water capacity is high. Runoff is moderate. Organic matter content is moderate, and natural fertility is high. Water intake rate under irrigation is moderate.

Most of the acreage of this soil is farmed and irrigated. Some is dryfarmed.

If dryfarmed, this soil is suited to commonly grown crops, such as corn, grain sorghum, wheat, and alfalfa. Alfalfa may receive additional moisture from the water table, which is more than 6 feet below the surface. Water erosion is a hazard if the soil surface is not protected by vegetation or crop residue. Conservation tillage, such as minimum tillage, reduces erosion and conserves moisture. Contour farming and terraces also reduce water erosion.

If irrigated, this soil is suited to corn, grain sorghum, and alfalfa. Leaving crop residue on the surface helps to prevent wind and water erosion and conserve moisture. This soil is suited to both gravity and sprinkler irrigation systems. Land leveling or contour bench leveling establishes a suitable grade for gravity systems. Terraces and contour farming can be used to control erosion under sprinkler irrigation. Efficiently using water and controlling runoff are important.

This soil is suited to pasture and hay. Production can be improved or maintained by stocking at proper rates and rotating grazing. Introduced grasses respond to fertilizer and irrigation. Grazing should be delayed in spring and after irrigation until the soil surface is firm and grass has reached minimum height. Production can be increased by growing a mixture of grasses and legumes.

This soil is suited to trees and shrubs for windbreaks. Seedlings generally survive and grow if competing vegetation is controlled or removed by good site preparation and timely cultivation between tree rows or use of approved herbicides.

Septic tank absorption fields function well if protected from flooding. Sewage lagoons need dikes as protection from flooding and should be sealed or lined to prevent seepage. Buildings can be constructed on elevated, well compacted fill above the flood level. Constructing roads on suitable, well compacted fill above the flood level and providing adequate side ditches and culverts help to protect roads from flood damage. Damage to roads by frost action can be reduced by providing good surface drainage. Crowning the road by grading and constructing adequate side ditches help to provide the needed surface drainage.

This soil is in capability units IIe-1 dryland and IIe-6 irrigated, Silty Lowland range site, and windbreak suitability group 1.

DuB—Dunday loamy fine sand, 0 to 3 percent slopes. This deep, nearly level and very gently sloping, well drained soil is on stream terraces. It formed in eolian sand. Individual areas range from 10 to 200 acres in size.

Typically, the surface layer is dark grayish brown, very friable loamy fine sand about 12 inches thick. The next 7 inches is pale brown loamy fine sand. The underlying material is pale brown fine sand in the upper part and light gray fine sand in the lower part to a depth of 60 inches. Some areas have thin layers of finer textured material in the underlying material. In some areas the surface layer is thinner and lighter in color.

Included with this soil in mapping in slightly higher positions are areas of Anselmo and Hersh soils. Anselmo and Hersh soils have less sand throughout. Included areas make up 10 to 20 percent of this map unit.

Permeability is rapid, and available water capacity is low. Runoff is very slow. Organic matter content is moderately low, and natural fertility is medium. Water intake rate is very high.

Most of the acreage of this soil is farmed and irrigated. Some areas are in native grass and are used for grazing or hay.

This soil is poorly suited to dryfarmed crops because of the severe hazard of wind erosion and the low available water capacity. Stripcropping, stubble mulching, field windbreaks, and leaving crop residue on the surface help to control wind erosion and conserve moisture. Limiting the use of row crops and growing close-grown crops help to protect the soil from blowing. Returning crop residue to the soil maintains or improves organic matter content and fertility.

Under sprinkler irrigation, this soil is suited to corn, grain sorghum, and alfalfa and grass for hay or pasture. This soil is not suited to gravity irrigation because of the very high intake rate and low available water capacity. Wind erosion can be reduced by leaving crop residue on the surface. Frequent, light applications of water and fertilizer help to prevent moisture stress in crops and leaching of nutrients. Returning crop residue to the soil improves or maintains organic matter content and fertility.

This soil is suited to pasture and hay. Production can be improved or maintained and the soil protected from wind by stocking at proper rates and rotating grazing. Fertilizing and growing a mixture of grasses and legumes also increase production.

Range vegetation controls wind erosion. Overgrazing or improper haying methods reduce the protective cover and can allow severe wind erosion, as well as decreasing the forage value of the vegetation. Proper grazing, deferred grazing or haying, and use of a planned grazing system maintain or improve range condition.

This soil is good for planting trees and shrubs for windbreaks. Low moisture supply and competition from weeds and grass are the principal limitations. Wind erosion is a hazard. Supplemental irrigation may be needed while windbreaks are being established. Weeds and grasses can be controlled by cultivation or use of approved herbicides. Wind erosion can be reduced by maintaining sod or a cover crop between rows.

This soil readily absorbs the effluent from septic tank absorption fields, but it does not adequately filter the effluent. As a result, ground water may become polluted. Sewage lagoons should be lined or sealed to reduce seepage. This soil is suited to dwellings, but excavations may slough or cave in unless shored. This soil is suited to local roads and streets.

This soil is in capability units IVe-5 dryland and IIIe-11 irrigated, Sandy range site, and windbreak suitability group 5.

EcB—Els fine sand, 0 to 3 percent slopes. This deep, nearly level and very gently sloping, somewhat poorly drained soil is in sandhill valleys. It formed in eolian sand. Individual areas range from 10 to 200 acres in size.

Typically, the surface layer is dark grayish brown, loose fine sand about 6 inches thick. The next 3 inches is grayish brown fine sand. The underlying material is light brownish gray fine sand in the upper part and light gray mottled fine sand in the lower part to a depth of 60 inches. In some areas the surface layer is more than 10 inches thick. Thin layers of loamy fine sand and fine sandy loam are common in the underlying material. Some areas are poorly drained.

Included with this soil in mapping are small areas of excessively drained Valentine soils. Valentine soils are in slightly higher positions. Inclusions make up 15 to 30 percent of the map unit.

Permeability is rapid, and available water capacity is low. Runoff is slow. The seasonal high water table is 1.5 feet deep in wet years to 3.5 feet deep in dry years. Organic matter content and natural fertility are low. Water intake rate is very high.

Nearly all of the acreage of this soil is rangeland used either for hay or for grazing. A few areas are cultivated under sprinkler irrigation.

This soil is generally not suitable for dryland farming because of the very severe hazard of wind erosion.

If sprinkler irrigated, this soil is poorly suited to corn, grain sorghum, and alfalfa. It is not suitable for gravity irrigation because of the soil's very high water intake rate and low available water capacity. Frequent, light applications of water and fertilizer help to prevent leaching of nutrients and conserve water. Wind erosion is a hazard if the soil surface is not protected by residue or growing crops. Leaving crop residue on the surface helps to prevent wind erosion.

Range vegetation controls wind erosion. Overgrazing or using improper haying methods reduces the protective cover and decreases forage value. When the soil is wet, overgrazing can cause surface compaction and formation of small mounds that make grazing and haying difficult. Proper grazing and deferred grazing or haying, along with restriction of use during very wet periods, maintain the plant community in good condition.

This soil is fair for planting trees and shrubs in windbreaks if the species selected can tolerate occasional wetness. Undesirable weeds and grasses can be controlled by cultivation or use of approved herbicides. Trees and shrubs should be planted in a shallow furrow with as little disturbance of the soil as possible to prevent wind erosion. Supplemental irrigation improves the survival rate of seedlings during dry periods.

The seasonal high water table restricts use of this soil for sanitary facilities and building sites. This soil readily absorbs the effluent from septic tank absorption fields,

but it does not adequately filter the effluent. As a result, ground water may become polluted. Sewage lagoons need to be sealed or lined to prevent seepage and constructed on fill to raise the bottom of the lagoon above the seasonal high water table. Dwellings and buildings can be constructed on elevated, well compacted fill above the seasonal high water table. Constructing roads on suitable, well compacted fill and providing adequate side ditches and culverts help to protect roads from damage caused by wetness. Damage to roads by frost action can be reduced by providing good surface drainage and by using a gravel moisture barrier in the subgrade. Crowning the road by grading and constructing adequate side ditches help to provide the needed surface drainage.

This soil is in capability units VIe-10 dryland and IVw-12 irrigated, Subirrigated range site, and windbreak suitability group 2S.

Fm—Fillmore Variant silt loam, 0 to 1 percent slopes. This deep, nearly level, poorly drained soil is in upland depressions. It formed in loess covered with recent stratified colluvium and alluvium. This soil is ponded most often in spring and fall after heavy rains. Individual areas are oval and range from 5 to 50 acres in size.

Typically, the surface layer is grayish brown, friable silt loam about 7 inches thick. The underlying material is light brownish gray, stratified silt loam and silty clay loam to a depth of 42 inches. Below this is a buried soil. Its surface layer is dark gray silt loam about 12 inches thick; its subsurface layer is light gray silt loam about 3 inches thick; and its subsoil is dark grayish brown silty clay to a depth of 72 inches. The underlying material of the buried soil is generally below a depth of 72 inches. In some places the buried soil is shallower or deeper.

Included with this soil in mapping are small areas of Hobbs and Scott soils. Hobbs soils are better drained and are silt loam throughout. Scott soils lack stratification. Inclusions make up 5 to 10 percent of the map unit.

Permeability is moderate above the clayey material and very slow in the clayey material. Available water capacity is high. This soil receives run-in water from adjacent higher areas. The perched seasonal high water table ranges from 0.5 foot above the surface to 3.0 feet below the surface. Organic matter content is moderate. Natural fertility is high. Water intake rate is moderate.

Most of the acreage of this soil is cultivated under dryland management. Some areas are in pasture used for grazing. Ponded water causes considerable crop losses about 4 years in 10. During wet seasons when cultivation is not possible, the vegetation is commonly annual weeds and grasses.

If dryfarmed, this soil is suited to corn and grain sorghum. Water-deposited silt can damage newly seeded crops. Wetness often delays planting. Alfalfa is generally not grown because it is easily damaged by ponded water. Wheat is often lost because of ponding in early spring or lodging resulting from wet conditions at harvest. Ponding and deposition of silt from the surrounding sloping Holdrege soils may cause surface crusting and damage newly seeded crops. Weeds are a problem when the soil surface is too wet for timely cultivation. Ponding can be reduced by good conservation on the surrounding gently sloping and strongly sloping Holdrege soils. Terraces, contour farming, grassed waterways, and minimum tillage on surrounding soils reduce runoff and ponding on this soil.

If irrigated, this soil is poorly suited to corn and grain sorghum. Generally, only center-pivot sprinkler irrigation systems are used on this soil because the surrounding soils are too sloping for gravity systems and this soil is in areas too small to irrigate separately. The same problems exist under irrigation as under dryland farming on this soil. In fact, ponding may be increased by irrigation if runoff is not controlled. Land leveling can improve surface drainage. Reuse pits on this soil remove excess irrigation water. Terraces, contour fariming, grassed waterways, and conservation tillage on surrounding soils reduce runoff and ponding on this soil. During very wet periods, wheels on center-pivot systems can become mired. Controlling runoff and grading ridges for the wheels of the center-pivot system to travel on may help to prevent miring.

This soil is poorly suited to pasture and hay. Ponding is the main problem. Surface drainage may be required to maintain satisfactory stands of grasses. Grazing or haying should be delayed until the soil surface is firm and grass has reached minimum height. Deposition of silt may damage grasses. Production can be improved or maintained by stocking at proper rates and rotating grazing. Introduced grasses respond to fertilizer and irrigation. Production can be increased by growing a mixture of grasses and legumes.

This soil is generally not suitable for range because growth of native grasses is limited by excessive periods of ponding.

This soil is fair for trees and shrubs for windbreaks if species that tolerate occasional wetness are used. Dikes or terraces prevent flooding. Land leveling improves surface drainage.

This soil is unsuitable for septic tank absorption fields and sewage lagoons because of ponding and the slow permeability. This soil is also unsuitable for dwellings and small commercial buildings because of ponding and the high shrink-swell potential of the underlying material. Constructing roads on raised, well compacted, suitable fill and providing adequate side ditches and culverts help to protect roads from damage by ponded water. The surface material and base material of roads must be thick enough to compensate for the low strength of the soil. Using coarser grained base material improves performance of paved roads. Damage to roads by frost

action can be reduced by providing good surface drainage. Crowning the road by grading and constructing adequate side ditches help to provide the needed surface drainage.

This soil is in capability units IIIw-2 dryland and IIIw-2 irrigated, Silty Overflow range site, and windbreak suitability group 2W.

Ga—Gannett loam, 0 to 1 percent slopes. This deep, nearly level, very poorly drained soil is on stream terraces. It formed in sandy and loamy alluvial material. This soil is ponded with surface water most often in spring and fall after heavy rains. Individual areas range from 10 to 200 acres in size.

Typically, the surface layer is dark grayish brown and dark gray, very friable, calcareous loam about 20 inches thick. The next 5 inches is light gray fine sandy loam. The underlying material is light gray, mottled, stratified fine sand to a depth of 60 inches. In some places the surface layer is thinner and lighter in color. Some areas of this soil are on bottom lands and are occasionally flooded.

Included with this soil in mapping are areas of Barney and Boel soils. Barney soils are in lower positions. Boel soils are better drained and are slightly higher. Inclusions make up 10 percent of the map unit.

Permeability is moderately rapid in the solum and rapid in the underlying material. Available water capacity is moderate. Runoff is very slow. The seasonal high water table is between 0.5 foot above ground in wet years and 1 foot below ground in dry years. Organic matter content is moderate, and natural fertility is medium.

Nearly all of the acreage of this soil is rangeland used for grazing or hay.

This soil is not suitable for cultivated crops, pasture, or hay because of the excessive wetness.

This soil is best suited to range for either grazing or haying, and can be very productive when managed properly. Overgrazing or improper haying methods reduce the protective cover and decrease the forage value of the vegetation. Overgrazing can also cause surface compaction and formation of small mounds, which make grazing or cutting hay difficult. Proper grazing, deferred grazing or haying, and restricted use during very wet periods maintain the plant community in good condition.

This soil is not suited to trees and shrubs for windbreaks because of the excessive wetness.

This soil is not suitable for septic tank absorption fields. Because of the rapid permeability of the underlying material, this soil does not adequately filter effluent from waste disposal systems. Seepage from septic tank absorption fields and sewage lagoons can contaminate the undergound water supply; therefore, other sites on suitable soils should be found. This soil is also unsuitable for dwellings because of ponding and wetness from the seasonal high water table. Other sites should be found. Constructing roads on suitable, well compacted fill above the ponding level and providing adequate side ditches and culverts help to protect roads from damage by ponded water. Damage to roads by frost action can be reduced by providing good surface drainage and by using a gravel moisture barrier in the subgrade. Crowning the road by grading and constructing adequate side ditches help to provide the needed surface drainage.

This soil is in capability unit Vw-7 dryland, Wetland range site, and windbreak suitability group 10.

Gb—Gannett and Loup loams, 0 to 2 percent slopes. These deep, nearly level, poorly drained soils are on bottom lands. They formed in loamy and sandy alluvium. The Gannett soil makes up about 55 percent of the map unit, and the Loup soil makes up about 30 percent. An individual area may contain one of the soils or both. Individual areas are adjacent to and parallel major rivers and streams. They are occasionally flooded. Areas range from 10 to 100 acres in size.

Typically, the Gannett soil has a surface layer of grayish brown, friable loam about 8 inches thick. The next 6 inches is light brownish gray, calcareous very fine sandy loam. The underlying material is 10 inches of light gray, mottled, very fine sandy loam over white fine sand to a depth of 60 inches.

Typically, the Loup soil has a surface layer of grayish brown, friable loam about 8 inches thick. The next 4 inches is light gray, very fine sandy loam. The underlying material is light gray, mottled fine sand in the upper part and white, mottled fine sand in the lower part to a depth of 60 inches.

Included with these soils in mapping are small areas of Barney and Boel soils. Barney soils are frequently flooded and are in slightly lower positions. Boel soils are somewhat poorly drained and are slightly higher. Inclusions make up about 15 percent of the map unit.

Permeability in both soils is moderately rapid in the upper part and rapid in the underlying sand. Available water capacity is moderate in the Gannett soil and low in the Loup soil. Runoff is slow on both soils. The seasonal high water table ranges from the surface in wet years to a depth of 1.5 feet in dry years. Organic matter content is moderate in both soils. Natural fertility is medium in the Gannett soil and low in the Loup soil. Both soils have carbonates at or near the surface.

Most of the acreage of these soils is rangeland used for grazing or hay.

These soils are not suitable for cultivated crops or pasture because of the excessive wetness.

These soils are best suited to range, for either grazing or hay, and can be very productive when managed properly. Overgrazing or improper haying methods reduce the protective cover and decrease the forage value of the vegetation. In addition, when the soil is wet overgrazing can cause surface compaction and

formation of small mounds, which make grazing or cutting hay difficult. Proper grazing, deferred grazing or haying, and restricted use during very wet periods maintain the plant community in good condition.

These soils are poor for planting trees and shrubs for windbreaks. Species that can tolerate occasional wetness survive and grow well. Flooding is a hazard to seedlings. Planting can be delayed in spring to avoid the wetness. Where necessary, weeds and undesirable grasses can be controlled by cultivation or use of approved herbicides.

These soils are not suited to septic tank absorption fields, sewage lagoons, dwellings, or small commercial buildings because of flooding and wetness. Because of the rapid permeability of the underlying material, these soils do not adequately filter effluent from waste disposal systems. Seepage from septic tank absorption fields and sewage lagoons could contaminate the underground water supply. Other sites should be found. Constructing roads or streets on suitable, well compacted fill and providing adequate side ditches and culverts help to protect roads and streets from flood damage and wetness. Damage to roads by frost action can be reduced by providing good surface drainage and by using a gravel moisture barrier in the subgrade. Crowning the road by grading and constructing adequate side ditches help to provide the needed surface drainage.

These soils are in capability unit Vw-7 dryland, Wet Subirrigated range site, and windbreak suitability group 10.

GfC—Gates very fine sandy loam, 3 to 6 percent slopes. This deep, gently sloping, well drained soil is on side slopes and ridges of uplands and valleys. It formed in recent loess in sand-loess transition areas. Individual areas range from 10 to 200 acres in size.

Typically, the surface layer is dark grayish brown, friable very fine sandy loam about 5 inches thick. The next 4 inches is grayish brown very fine sandy loam. The underlying material is very pale brown, very fine sandy loam to a depth of 60 inches. Some areas are calcareous to the surface.

Included with this soil in mapping are a few small areas of Graybert, Hersh, and Kenesaw soils. Graybert soils have a dark surface layer and a buried soil at a depth of 20 to 40 inches. Hersh soils are fine sandy loam throughout. Kenesaw soils have a darker surface layer. Inclusions make up 10 to 20 percent of the map unit.

Permeability is moderate, and available water capacity is high. Runoff is medium. Organic matter content is low, and natural fertility is medium. Water intake rate is moderate.

Most of the acreage of this soil is farmed.

If dryfarmed, this soil is suited to corn, grain sorghum, wheat, and alfalfa. Water and wind erosion is a hazard where the surface is not adequately protected by vegetation or crop residue. Leaving crop residue on the surface helps to prevent erosion and conserves soil moisture. Terraces and contour farming also help to prevent water erosion. Crop residue and green manure crops maintain and improve organic matter content and fertility.

If irrigated, this soil is suited to corn, grain sorghum, and alfalfa. There is a hazard of water and wind erosion. Conservation tillage that leaves crop residue on the surface helps to prevent erosion and conserve moisture. Terraces and contour farming also help to prevent water erosion. This soil is suited mainly to sprinkler irrigation systems because the slope is generally too steep for gravity systems. Efficiently managing irrigation water and controlling runoff are concerns.

This soil is suited to pasture and hay. Production is improved or maintained by stocking at proper rates, rotating grazing, and growing a mixture of grasses and legumes. Introduced grasses respond to fertilizer and irrigation. Grazing should be delayed in spring and after irrigation until the soil surface is firm and grass has reached minimum height.

This soil is suited to range for both grazing and haying. Range vegetation controls water erosion. Overgrazing or improper haying methods reduce the protective cover and can allow severe water erosion, as well as decreasing the forage value of the vegetation. Proper grazing, deferred grazing or haying, and use of a planned grazing system maintain or improve range condition.

This soil is suited to trees and shrubs for windbreaks. Seedlings generally survive and grow well if competing vegetation is controlled and moisture is adequate while windbreaks are being established. Competing vegetation can be controlled by good site preparation, timely cultivation, or approved herbicides. Cover crops between rows help to prevent water and wind erosion. Irrigation provides needed moisture during dry periods.

This soil is generally suited to septic tank absorption fields and dwellings. Sewage lagoons may seep unless sealed or lined. Small commercial buildings can be designed to accommodate the slope, or the soil can be graded to an acceptable slope. Damage to local roads and streets by frost action can be reduced by providing good surface drainage. Crowning the road by grading and constructing adequate side ditches help to provide the needed surface drainage.

This soil is in capability units IIIe-1 dryland and IIIe-6 irrigated, Silty range site, and windbreak suitability group 3.

GfD—Gates very fine sandy loam, 6 to 11 percent slope. This deep, strongly sloping, well drained soil is on sides and narrow tops of ridges in valleys and on uplands. It formed in recent loess. Individual areas range from 10 to 200 acres in size.

Typically, the surface layer is light gray, friable very fine sandy loam about 5 inches thick. The next 13 inches

is very pale brown very fine sandy loam. The underlying material is light gray, very fine sandy loam to a depth of 60 inches. In some places the surface layer is fine sandy loam or is darker in color.

Included with this soil in mapping are small areas of Hersh soils. Hersh soils are fine sandy loam throughout. Inclusions make up 10 to 20 percent of the map unit.

Permeability is moderate, and available water capacity is high. Runoff is rapid. Organic matter content is low, and natural fertility is medium. Water intake rate is moderate.

Most of the acreage of this soil is farmed.

If dryfarmed, this soil is poorly suited to corn, grain sorghum, wheat, and alfalfa. Water and wind erosion is the main hazard. Leaving crop residue on the surface helps to prevent water and wind erosion. Terraces and contour farming also help to prevent water erosion. Returning crop residue and green manure crops to the soil improves organic matter content and fertility.

Under sprinkler irrigation, this soil is poorly suited to corn and grain sorghum. It is not suited to gravity irrigation systems because of the slope. Leaving crop residue on the surface helps to control erosion. Terraces and contour farming also help to prevent water erosion. Growing close-grown crops, such as alfalfa and grasses, protects the soil from erosion. Adjusting water application rates to the moderate intake rate of the soil permits most of the water to be absorbed and reduces runoff.

This soil is suited to pasture and hay Water erosion is possible on over-used areas. Production can be improved or maintained by stocking at proper rates and rotating grazing. Introduced grasses respond to fertilizer and sprinkler irrigation. Irrigation water applications should not exceed the soil's water intake rate. Grazing should be delayed in the spring until the grass has reached minimum height. Production can be increased by growing a mixture of grasses and legumes.

Range vegetation controls water erosion, but overgrazing reduces the protective cover and can allow severe gully erosion. Overgrazing also decreases the forage value of the vegetation. Proper grazing, deferred grazing, and use of a planned grazing system maintain or improve range condition.

This soil is suited to trees and shrubs for windbreaks. Seedlings generally survive and grow well if competing vegetation is controlled and an adequate supply of moisture is available during establishment. Competing vegetation can be controlled by good site preparation, timely cultivation, or use of approved herbicides. Cover crops between rows help to prevent water erosion.

For septic tank absorption fields to operate properly, the surface has to be reshaped and the lines have to be installed on the contour. Slope also has to be modified for sewage lagoons, and they have to be sealed or lined to prevent seepage. Dwellings and small commercial buildings can be designed to fit the slope, or the soil can be graded to an acceptable slope. Cutting and filling provides a suitable grade for roads and streets. Damage to roads and streets by frost action can be reduced by providing good surface drainage. Crowning the road by grading and constructing adequate side ditches help to provide the needed surface drainage.

This soil is in capability units IVe-9 dryland and IVe-6 irrigated, Silty range site, and windbreak suitability group 3.

GfE—Gates very fine sandy loam, 11 to 15 percent slopes. This deep, moderately steep, well drained soil is on narrow tops and sides of ridges in loess-sand transition areas on uplands. This soil formed in recent loess. Individual areas range from 10 to 200 acres in size.

Typically, the surface layer is pale brown, friable very fine sandy loam about 8 inches thick. The next 10 inches is very pale brown, very fine sandy loam. The underlying material is light gray and very pale brown, very fine sandy loam to a depth of 60 inches. Some areas have a fine sandy loam surface layer.

Included with this soil in mapping are small areas of Hersh and Valentine soils in hummocky areas. These soils have more sand throughout. Inclusions make up 5 to 15 percent of the map unit.

Permeability is moderate, and available water capacity is high. Runoff is rapid. Organic matter content is low, and natural fertility is medium.

Most areas of this soil are in native or introduced grasses and are used for grazing.

This soil is generally not suitable for farming because of the very severe water erosion hazard on the moderately steep slopes.

This soil is suited to range for either grazing or haying. Range vegetation controls water erosion. Overgrazing can reduce the protective cover and decrease the forage value of the vegetation. Gullies may be cut by water erosion if livestock continuously take the same path to water and salt facilities. Carefully locating an adequate number of water and salt facilities help to eliminate livestock paths. Deferred grazing and proper grazing improve range condition.

This soil is suited to trees and shrubs for windbreaks. Seedlings generally survive and grow well if competing vegetation is controlled and moisture is adequate while windbreaks are being established. Competing vegetation can be controlled by good site preparation, timely cultivation, or approved herbicides. Water erosion can be severe while windbreaks are being established. Maintaining a cover crop or strips of soil between rows and terracing help to prevent water erosion.

For septic tank absorption fields to operate properly, the slope can be modified or the lines can be installed on the contour. Slope also has to be modified for sewage lagoons, and they must be sealed or lined to prevent seepage. Dwellings and small commercial

buildings can be designed to accommodate the slope, or the soil can be graded to an acceptable slope. Cutting and filling provides a suitable grade for roads and streets. Damage to roads and streets by frost action can be reduced by providing good surface drainage. Crowning the road by grading and constructing adequate side ditches help to provide the needed surface drainage.

This soil in capability unit VIe-9 dryland, Silty range site, and windbreak suitability group 3.

GfF—Gates very fine sandy loam, 15 to 30 percent slopes. This deep, steep, somewhat excessively drained soil is on narrow tops and sides of ridges in loess-sand transition areas on uplands. This soil formed in recent loess. Individual areas range from 15 to 300 acres in size.

Typically, the surface layer is brown, friable very fine sandy loam about 4 inches thick. The next 2 inches is light brownish gray very fine sandy loam. The underlying material is very pale brown very fine sandy loam to a depth of 60 inches. In some places the surface layer is fine sandy loam.

Included with this soil in mapping are small areas of Hersh and Valentine soils. These soils have more sand throughout. Inclusions make up 10 to 20 percent of the map unit.

Permeability is moderate, and available water capacity is high. Runoff is rapid. Organic matter content is low, and natural fertility is medium.

Nearly all of the acreage of this soil is rangeland used for grazing.

This soil is not suitable for crops, pasture, hay, or windbreaks because of the very severe erosion hazard.

Range vegetation controls water erosion, but overgrazing reduces the protective cover and can allow severe water erosion and gullying. Overgrazing also decreases the forage value of the vegetation. Proper grazing, deferred grazing, and use of a planned grazing system maintain or improve range condition. Providing adequate water and salt facilities helps to distribute livestock uniformly and prevent overgrazing near such facilities.

This soil is generally not suitable for septic tank absorption fields and sewage lagoons because of the steep slopes. More suitable soils are usually near. Dwellings and small commercial buildings can be designed to fit the slope, or the soil can be graded to an acceptable slope. Damage to roads by frost action can be reduced by providing good surface drainage. Crowning the road by grading and constructing adequate side ditches help to provide the needed surface drainage. Cutting and filling provides a suitable grade for roads.

This soil is in capability unit VIe-9 dryland, Silty range site, and windbreak suitability group 10.

GhG—Gates-Hersh complex, 30 to 60 percent slopes. These deep, excessively drained, very steep soils are on deeply dissected uplands. The Gates soil formed in recent loess, and the Hersh soil formed in loamy eolian material. The Gates soil makes up about 45 to 60 percent of this complex, and the Hersh soil makes up about 30 percent. Areas of the two soils are so intricately mixed or so small that separating them in mapping is not practical. Areas of this complex range from 10 acres to several hundred acres in size.

Typically, the Gates soil has a surface layer of light brownish gray, very friable very fine sandy loam about 4 inches thick. The next 14 inches is light gray, very friable very fine sandy loam. The underlying material is very pale brown, calcareous very fine sandy loam to a depth of 60 inches.

Typically, the Hersh soil has a surface layer of grayish brown, very friable fine sandy loam about 6 inches thick. The next 3 inches is light brownish gray, very friable fine sandy loam. The underlying material is pale brown fine sandy loam in the upper part and very pale brown loamy fine sand in the lower part to a depth of 60 inches.

Included with these soils in mapping are areas of Hobbs and Valentine soils. Hobbs soils are occasionally flooded and are on narrow bottom lands below the very steep Gates and Hersh soils. Valentine soils have more sand throughout, are excessively drained, and are in hummocky areas. Inclusions make up 10 to 25 percent of the map unit.

Permeability is moderate in the Gates soil and moderately rapid in the Hersh soil. Available water capacity is high in the Gates soil and moderate in the Hersh soil. Runoff is very rapid on both soils. Organic matter content is low. Natural fertility is low in the Hersh soil and medium in the Gates soil.

All of the acreage of this complex is rangeland used for grazing or wildlife habitat. These soils provide excellent habitat for many kinds of wildlife common to Custer County.

This map unit is unsuitable for dryfarmed or irrigated crops, pasture, or hay because of the very steep slope.

These soils are suited to range. Livestock tend to graze only the less sloping, easily accessible areas. Overgrazing reduces the forage value of the vegetation and can allow severe erosion. Deferring grazing and using a planned grazing system maintain or improve range condition. Gullies may be cut by water if livestock continuously take the same path on steep slopes to water and salt facilities. Carefully locating an adequate number of water and salt facilities may help to eliminate livestock paths on steep slopes and distribute livestock for more uniform grazing.

These soils are unsuitable for trees and shrubs for windbreaks. However, trees and shrubs may be hand planted for wildlife habitat.

These soils are well suited to habitat for such wildlife as pheasant, quail, prairie chicken, grouse, rabbit,

coyote, and deer. They provide both food and good cover for these animals.

These soils are unsuitable for buildings, sanitary facilities, and local roads because of very steep slopes and rough terrain. Extensive grading and earth moving would be required for roads. In many areas, roads are simply routed around these soils to avoid construction problems.

These soils are in capability unit VIIe-9 and windbreak suitability group 10. The Gates soil is in Silty range site, and the Hersh soil is in Sandy range site.

Gk—Gibbon silt loam, 0 to 1 percent slopes. This deep, nearly level, somewhat poorly drained soil is on bottom lands along major streams and rivers. It formed in alluvium. This soil is occasionally flooded for very brief periods. Individual areas are 10 to 80 acres in size.

Typically, the surface layer is very dark grayish brown, friable silt loam about 10 inches thick. The next 9 inches is light brownish gray, mottled silt loam. Below this is a buried surface layer of grayish brown, mottled silt loam 14 inches thick. The underlying material below the buried surface layer is light brownish gray, mottled, very fine sandy loam to a depth of 60 inches. In some places, the buried soil is absent or the surface layer is very fine sandy loam.

Included with this soil in mapping are small areas of Ord and Boel soils. Ord and Boel soils have more sand throughout and are in similar positions. Included areas make up 5 to 15 percent of the map unit.

Permeability is moderate, and available water capacity is high. Runoff is slow. The seasonal high water table ranges from a depth of 1.5 feet in wet years to a depth of 3.0 feet in dry years. Tilth is good, although wetness may delay tillage in spring. Organic matter content is moderate, and natural fertility is medium. The soil is calcareous throughout. Water intake rate is moderate.

Most of the acreage of this soil is farmed. A few areas are rangeland used for grazing or hay.

If dryfarmed, this soil is suited to corn, grain sorghum, wheat, oats, and alfalfa. Poor surface drainage and the seasonal high water table may delay field operations and slow warming of the soil in spring. If wetness persists into the growing season, crops may be damaged. Deep-rooted crops may receive extra moisture from the water table, which can be especially important in dry years. Land leveling improves surface drainage, and tile or open ditch drainage systems lower the water table if suitable outlets are available.

If irrigated, this soil is suited to corn, grain sorghum, and alfalfa. Gravity or sprinkler systems can be used. Soil wetness can be reduced by land leveling to establish surface drainage. Land leveling also establishes a suitable grade for gravity irrigation systems. Tile drains or open ditches lower the water table if suitable outlets are available. Efficient water management is a concern.

This soil is suited to pasture and hay. Wetness and flooding are problems. Grazing or haying should be delayed until the soil surface is firm and grass has reached minimum height. Production can be improved or maintained by stocking at proper rates and rotating grazing. Introduced grasses respond to fertilizer and irrigation. Production can be increased by growing a mixture of grasses and legumes.

Range vegetation controls wind erosion. Overgrazing or improper haying methods reduce the protective cover and decrease the forage value of the vegetation. In addition, when the soil is wet overgrazing can cause surface compaction and small mounds, which make grazing or cutting difficult. Proper grazing, deferred grazing or haying, and restricted use during very wet periods maintain the plant community in good condition.

This soil is good for planting trees and shrubs for windbreaks. Species that tolerate occasional wetness survive and grow well. Competition from weeds and grasses can be controlled by cultivation or by use of approved herbicides.

This soil is generally not suitable for septic tank absorption fields, sewage lagoons, dwellings or small commercial buildings because of flooding and wetness. Constructing roads on suitable, well compacted fill and providing adequate side ditches and culverts help to protect roads from flood damage and wetness. Damage to roads by frost action can be reduced by providing good surface drainage and by using a gravel moisture barrier in the subgrade. Crowning the road by grading and constructing adequate side ditches help to provide the needed surface drainage.

This soil is in capability units IIw-4 dryland and IIw-6 irrigated, Subirrigated range site, and windbreak suitability group 2S.

Gr—Graybert very fine sandy loam, 0 to 1 percent slopes. This deep, nearly level, well drained soil is in valleys in sand-loess transition areas. It formed in recent loess over buried soils that also formed in loess. Individual areas range from 15 to 100 acres in size.

Typically, the surface layer is very friable very fine sandy loam about 10 inches thick. It is grayish brown in the upper part and dark grayish brown in the lower part. The subsoil is light brownish gray, very fine sandy loam 14 inches thick. The next layer is a buried surface layer of dark grayish brown silt loam about 14 inches thick. The buried subsoil is grayish brown silt loam in the upper part and light brownish gray silt loam in the lower part. The underlying material is light gray silt loam to a depth of 60 inches. Some areas have a thicker surface layer. Generally, the buried soil is at a depth of 20 and 40 inches, but in places it is shallower or deeper.

Included with this soil in mapping in slightly higher positions are areas of Hersh and Gates soils. Gates soils have a thinner, lighter colored surface layer. Hersh soils

have more sand throughout. Inclusions make up 10 to 15 percent of the map unit.

Permeability is moderate, and available water capacity is high. Runoff is slow. Tilth is good. Organic matter content is moderate, and natural fertility is high. Water intake rate is moderate.

Most of the acreage of this soil is farmed.

If dryfarmed, this soil is suited to corn, grain sorghum, wheat, and alfalfa. Droughtiness and wind erosion are hazards when rainfall is limited or where the surface is not adequately protected by vegetation or crop residue. Leaving crop residue on the soil surface helps to prevent wind erosion and conserves soil moisture. Returning crop residue and green manure crops to the soil increases organic matter content and fertility.

If irrigated, this soil is suited to corn, grain sorghum, and alfalfa. Conservation tillage practices control wind erosion. Gravity or sprinkler irrigation systems can be used on this soil. Efficient water management is a concern. Under gravity irrigation, reuse systems improve efficiency and conserve water.

This soil is suited to pasture and hay. Production can be improved or maintained by stocking at proper rates and rotating grazing. Introduced grasses respond to fertilizer and irrigation. Grazing should be delayed in spring and after irrigation until the soil surface is firm and grass has reached minimum height. Production can be increased by growing a mixture of grasses and legumes.

This soil is suited to trees and shrubs for windbreaks. Seedlings generally survive and grow well if competing vegetation is controlled or removed by good site preparation, timely cultivation, or use of approved herbicides. Wind erosion can be controlled by maintaining strips of sod or a cover crop between the tree rows. Supplemental irrigation increases seedling survival.

This soil is suited to septic tank absorption fields. Sewage lagoons may seep unless lined or sealed. This soil provides good sites for dwellings and small commercial buildings. Damage to roads and streets by frost action can be reduced by providing good surface drainage. Crowning the road by grading and constructing adequate side ditches help to provide the needed surface drainage.

This soil is in capability units IIc-1 dryland and I-6 irrigated, Silty range site, windbreak suitability group 3.

GrB—Graybert very fine sandy loam, 1 to 3 percent slopes. This deep, very gently sloping, well drained soil is in valleys in sand-loess transition areas. It formed in recent loess over buried soils that also formed in loess. Individual areas range from 15 acres to several hundred acres in size.

Typically, the surface layer is grayish brown, very friable very fine sandy loam about 8 inches thick. The subsoil is brown very fine sandy loam 14 inches thick. The next 20 inches is a buried surface layer of silt loam. It is dark grayish brown in the upper part and grayish brown in the lower part. The buried subsoil is grayish brown silt loam to a depth of 60 inches. Some areas have a thicker surface layer. Generally, the buried soil is at a depth of 20 to 40 inches, but in places it is shallower or deeper.

Included with this soil in mapping in slightly higher positions are small areas of Gates and Hersh soils. Gates soils have a thinner, lighter colored surface layer. Hersh soils have more sand throughout. Inclusions make up 10 to 15 percent of the map unit.

Permeability is moderate, and available water capacity is high. Runoff is slow. Tilth is good. Organic matter content is moderate, and natural fertility is high. Water intake rate is moderate.

Most of the acreage of this soil is farmed.

If dryfarmed, this soil is suited to corn, grain sorghum, wheat, and alfalfa. Water erosion is a hazard where the soil surface is not adequately protected by vegetation or crop residue. Leaving crop residue on the surface helps to prevent erosion by wind and water and conserves soil moisture. Contour farming and terraces also help to prevent water erosion. Returning crop residue and green manure crops to the soil maintains or improves organic matter content and fertility.

If irrigated, this soil is suited to corn, grain sorghum, and alfalfa. Leaving crop residue on the surface helps to prevent erosion by wind and water and conserves moisture. This soil is suited to both gravity and sprinkler irrigation systems. Land leveling or contour bench leveling establishes a suitable grade for gravity systems. Sprinkler systems are commonly used where adjacent soils are too steep for gravity irrigation. Terraces and contour farming can be used to control water erosion under sprinkler irrigation. Efficiently using water and controlling runoff are important.

This soil is suited to pasture and hay. Production can be improved or maintained by stocking at proper rates and rotating grazing. Introduced grasses respond to fertilizer irrigation. Grazing should be delayed in spring and after irrigation until the soil surface is firm and grass has reached minimum height. Production can be increased by growing a mixture of grasses and legumes.

This soil is suited to trees and shrubs for windbreaks. Seedlings generally survive and grow well if competing vegetation is controlled or removed by good site preparation and by timely cultivation or use of approved herbicides. Strips of sod or a cover crop between tree rows help to prevent erosion. Supplemental irrigation increases seedling survival during dry periods.

This soil is suited to septic tank absorption fields. Sewage lagoons may seep unless lined or sealed. This soil provides good sites for dwellings and small commerical buildings. Damage to roads and streets by frost action can be reduced by providing good surface drainage. Crowning the road by grading and constructing adequate side ditches help to provide the needed surface drainage.

This soil is in capability units IIe-1 dryland and IIe-6 irrigated, Silty range site, and windbreak suitability group 3.

GrC—Graybert very fine sandy loam, 3 to 6 percent slopes. This deep, gently sloping, well drained soil is in valleys in sand-loess transition areas. It formed in recent loess over buried soils that also formed in loess. Individual areas of this soil range from 10 to 200 acres in size.

Typically, the surface layer is dark grayish brown, very friable very fine sandy loam about 12 inches thick. The subsoil is grayish brown fine sandy loam 15 inches thick. Below this is a buried surface layer 16 inches thick. It is dark grayish brown silt loam in the upper part and grayish brown silt loam in the lower part. The buried subsoil is grayish brown silt loam to a depth of 60 inches. Generally, the buried soil is at a depth of 20 to 40 inches, but in places it is shallower or deeper.

Included with this soil in mapping are small areas of Gates and Hersh soils. Gates soils do not have a buried soil and have a lighter colored, thinner surface layer. Hersh soils have more sand throughout. Inclusions make up 5 to 15 percent of the map unit.

Permeability is moderate, and available water capacity is high. Runoff is medium. Tilth is good. Organic matter content is moderate, and natural fertility is high. Water intake rate is moderate.

Most of the acreage of this soil is farmed.

If dryfarmed, this soil is suited to corn, grain sorghum, wheat, and alfalfa. Water erosion is a hazard where the surface is not adequately protected by vegetation or crop residue. Terraces, contour farming, and conservation tillage practices, such as minimum tillage, help to prevent water erosion. Returning crop residue and green manure crops to the soil improves or maintains soil fertility.

Under sprinkler irrigation, this soil is suited to corn, grain sorghum, and alfalfa and grasses for hay or pasture. Terraces, contour farming, and conservation tillage (such as till-plant, no-till, disk-and-plant) help to prevent water erosion. This soil is generally too sloping for gravity systems. Center-pivot sprinkler systems are the most common. Growing close-grown crops, such as alfalfa and grasses, helps to reduce runoff and erosion. Efficiently using water and controlling runoff are concerns.

This soil is suited to pasture and hay. Water and wind erosion can be controlled by such conservation practices as terraces and adequate cover on the surface. Production can be improved or maintained by stocking at proper rates and rotating grazing. Introduced grasses respond to fertilizer and sprinkler irrigation. Irrigation water applications should be adjusted to the soil's water intake rate. Grazing should be delayed in spring until the grass has reached minimum height. Production can be increased by growing a mixture of grasses and legumes.

This soil is suited to range. Range vegetation controls water erosion. Overgrazing or improper haying methods reduce the protective cover and decrease the forage value of the vegetation. Proper grazing, deferred grazing or haying, and use of a planned grazing system maintain or improve range conditions.

This soil is suited to trees and shrubs for windbreaks. Seedlings generally survive and grow well if competing vegetation is controlled or removed by good site preparation and by timely cultivation or use of approved herbicides. Planting trees and shrubs on the contour or terracing help to prevent water erosion. Maintaining strips of sod or a cover crop between rows also helps to prevent erosion. Irrigation can provide extra moisture in dry periods.

This soil is suited to septic tank absorption fields. Sewage lagoons may seep unless lined or sealed. Slope can be modified for sewage lagoons. This soil provides good sites for dwellings and small commercial buildings. Damage to roads and streets by frost action can be reduced by providing good surface drainage. Crowning the road by grading and constructing adequate side ditches help to provide the needed drainage.

This soil is in capability units IIIe-1 dryland and IIIe-6 irrigated, Silty range site, and windbreak suitability group 3.

Ha—Hall silt loam, 0 to 1 percent slopes. This deep, nearly level, well drained soil is on uplands and in valleys. It formed in loess. Individual areas range from 10 acres to several hundred acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 8 inches thick. The subsurface layer is very dark grayish brown silt loam about 16 inches thick. The subsoil is silty clay loam about 16 inches thick. It is dark grayish brown in the upper part and grayish brown in the lower part. The underlying material is light brownish gray silt loam to a depth of 60 inches. In some areas the subsurface layer is thinner or the subsoil contains less clay.

Included with this soil in mapping are small areas of Fillmore Variant soils. Fillmore Variant soils have more clay in the subsoil. Fillmore Variant soils are in depressions below Hall soils and occasionally are ponded with runoff water from adjacent areas. Inclusions make up less than 10 percent of the map unit.

Permeability is moderate, and available water capacity is high. Runoff is slow. Organic matter content is moderate, and natural fertility is high. Water intake rate is moderately low.

Most acreage of this soil is used for cultivated crops.

If dryfarmed, this soil is suited to corn, grain sorghum, wheat, and alfalfa. Droughtiness and wind erosion are possible if rainfall is limited or if the surface is not adequately protected by growing plants or crop residue. Conservation tillage practices, such as minimum tillage, help to prevent wind erosion and conserve moisture.

If irrigated, this soil is suited to corn, grain sorghum, and alfalfa. Conservation tillage controls wind erosion. This soil is suited to both gravity and sprinkler irrigation systems. Efficiently using water and controlling runoff are important.

This soil is suited to pasture and hay. Production can be improved or maintained by stocking at proper rates and rotating grazing. Introduced grasses respond to fertilizer and irrigation. Grazing should be delayed in the spring and after irrigation until the soil surface is firm and grass has reached minimum height. Production can be increased by growing a mixture of grasses and legumes.

This soil is suited to trees and shrubs for windbreaks. Seedlings generally survive and grow if competing vegetation is controlled or moved by good site preparation and by timely cultivation between tree rows. Irrigation can supplement moisture in dry periods while windbreaks are being established.

This soil is suited to septic tank absorption fields. Sewage lagoons may seep unless sealed or lined. This soil is suited to dwellings and small commercial buildings, but the moderate shrink-swell potential of the subsoil needs to be considered in designing the foundation. The surface material and base material of roads must be thick enough to compensate for the low strength of the soil. Using coarser-grained base material improves performance of paved roads.

This soil is in capability units IIc-1 dryland and I-4 irrigated, Silty range site, and windbreak suitabilty group 3.

HaB—Hall silt loam, 1 to 3 percent slopes. This deep, very gently sloping, well drained soil is on uplands and in valleys. It formed in loess. Individual areas range from 10 acres to several hundred acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 7 inches thick. The subsurface layer is dark grayish brown, friable silt loam about 10 inches thick. The subsoil is about 19 inches thick. It is dark grayish brown silty clay loam in the upper part and light brownish gray silt loam in the lower part. The underlying material is very pale brown silt loam in the upper part and light gray silt loam in the lower part to a depth of 60 inches. In some places the dark upper layers are less than 20 inches thick. In other places the subsoil has less clay.

Included with this soil in mapping are small areas of Fillmore Variant soils. Fillmore Variant soils are ponded with surface water and have more clay in the lower part of the subsoil. Inclusions make up less than 10 percent of the map unit.

Permeability is moderate, and available water capacity is high. Runoff is medium. Organic matter content is moderate, and natural fertility is high. Water intake rate is moderately low.

Most of the acreage of this soil is farmed.

If dryfarmed, this soil is suited to corn, grain sorghum, wheat, and alfalfa. Water erosion is a hazard if the soil surface is not protected by vegetation or crop residue. Conservation tillage practices, such as minimum tillage, help to prevent erosion and conserve moisture. Contour farming and terraces help to prevent water erosion.

If irrigated, this soil is suited to corn, grain sorghum, and alfalfa. Conservation tillage (such as no-till, till-plant, disk-plant) help to prevent erosion. This soil is suited to both gravity and sprinkler irrigation systems. Land leveling or contour bench leveling establishes a suitable grade for gravity systems. Sprinkler systems are commonly used where adjacent soils are too sloping for gravity irrigation. Terraces and contour farming reduce erosion under sprinkler irrigation. Efficiently using water and controlling runoff are important.

This soil is suited to pasture and hay. Production can be improved or maintained by stocking at proper rates and rotating grazing. Introduced grasses respond to fertilizer and irrigation. Grazing should be delayed in spring and after irrigation until the soil surface is firm and grass has reached minimum height. Production can be increased by growing a mixture of grasses and legumes.

This soil is suited to trees and shrubs for windbreaks. Seedlings generally survive and grow if competing vegetation is controlled or removed by good site preparation and by timely cultivation between tree rows. Irrigation can supplement moisture in dry periods while windbreaks are being established.

This soil is suited to septic tank absorption fields. Sewage lagoons may seep unless sealed or lined. This soil is suited to dwellings and small commercial buildings, but the moderate shrink-swell potential of the subsoil needs to be considered in designing the foundation. The surface material and base material of roads must be thick enough to compensate for the low strength of the soil. Using coarser-grained base material improves performance of paved roads.

This soil is in capability units IIe-1 dryland and IIe-4 irrigated, Silty range site, and windbreak suitability group 3.

HeB—Hersh fine sandy loam, 0 to 3 percent slopes. This deep, nearly level and very gently sloping, well drained soil is in swales, on gently undulating uplands, and in gently undulating valleys. It formed in sandy and loamy eolian material. Individual areas range from 10 to 100 acres in size.

Typically, the surface layer is grayish brown, very friable fine sandy loam about 4 inches thick. The next 7 inches is pale brown fine sandy loam. The underlying material is very pale brown fine sandy loam to a depth of 60 inches. In some places the lower part of the underlying material is loamy fine sand.

Included with this soil in mapping are small areas of Gates, Kenesaw, and Valentine soils. Kenesaw and Gates soils are in similar positions and Valentine soils

are slightly higher. Gates and Kenesaw soils are very fine sandy loam throughout. Kenesaw soils have a thicker dark colored surface layer. Valentine soils contain more sand and less clay and silt throughout. Included areas make up 5 to 20 percent of the map unit.

Permeability is moderately rapid. Available water capacity is moderate. Runoff is slow. Organic matter content and natural fertility are low. Water intake rate is moderately high.

Most of the acreage of this soil is farmed.

If dryfarmed, this soil is suited to corn, grain sorghum, wheat, and alfalfa. Wind erosion is the major hazard where the surface is not protected by crop residue or vegetation. Leaving crop residue on the soil surface and growing close-grown crops help to prevent wind erosion and conserve moisture. Stripcropping and field windbreaks help to prevent wind erosion. Returning crop residue to the soil maintains and improves organic matter content and fertility.

If irrigated, this soil is suited to corn, grain sorghum, and alfalfa. Leaving crop residue on the soil surface helps to prevent wind erosion and conserves moisture. Because this soil is commonly slightly hummocky and the adjacent soils are commonly hummocky, sprinkler irrigation offers the best means of applying water uniformly at the desired rate. Some areas have been leveled for gravity irrigation systems. Gravity systems require relatively short runs because of the soil's moderately high water intake rate. The moderate available water capacity requires a relatively short time between water applications during peak use periods.

This soil is suited to pasture and hay. Production can be improved or maintained and the soil protected from wind by stocking at proper rates and rotating grazing. Fertilizing and growing a mixture of grasses and legumes increase production.

Range vegetation controls wind erosion. Overgrazing or improper haying methods reduce the protective cover and can allow severe wind erosion and creation of small blowouts, as well as decreasing the forage value of the vegetation. Proper grazing, deferred grazing or haying, and use of a planned grazing system maintain or improve range condition.

Windbreaks have a good chance for survival and growth if moisture is adequate, wind erosion is controlled, and competition from weeds and grasses is eliminated. Where water is available, irrigation can supplement moisture during dry periods. Strips of sod between rows help to prevent wind erosion. Cultivation or use of approved herbicides control weeds and grasses.

Septic tank absorption fields function well in this soil. Sewage lagoons may seep unless sealed or lined. The walls or sides of shallow excavations may slough or cave in unless shored. This soil is suited to dwellings and small commerical buildings. Damage to roads and streets by frost action can be reduced by providing good surface drainage. Crowning the road by grading and constructing adequate side ditches help to provide the needed surface drainage.

This soil is in capability units IIIe-3 dryland and IIe-8 irrigated, Sandy range site, and windbreak suitability group 5.

HeC—Hersh fine sandy loam, 3 to 6 percent slopes. This deep, gently sloping, well drained soil is on undulating uplands and in undulating valleys. It formed in sandy and loamy eolian material. Individual areas range from 10 to 200 acres in size.

Typically, the surface layer is grayish brown, very friable fine sandy loam about 5 inches thick. The next 5 inches is also grayish brown fine sandy loam. The underlying material is pale brown fine sandy loam to a depth of 60 inches. In some places the surface layer is loamy fine sand.

Included with this soil in mapping are small areas of Gates soils in similar positions and Valentine soils in undulating areas. Gates soils are very fine sandy loam throughout. Valentine soils have more sand throughout. Inclusions make up 5 to 15 percent of the map unit.

Permeability is moderately rapid, and available water capacity is moderate. Runoff is slow. Organic matter content and natural fertility are low. Water intake rate is moderately high.

Most of the acreage of this soil is farmed.

If dryfarmed, this soil is suited to corn, grain sorghum, wheat, and alfalfa and grasses for hay or pasture. Water and wind erosion are the main hazards. Where slopes are suitable, terraces and contour farming reduce water and wind erosion. Leaving crop residue on the surface helps to prevent wind erosion and conserves moisture. Returning crop residue and green manure crops to the soil maintains or improves organic matter content and fertility.

If irrigated this soil is suited to corn, alfalfa, and grasses. The soil is too sloping for gravity systems. Leaving crop residue on the surface and growing close-grown crops help to control water and wind erosion. Where slopes are suitable, terraces and contour farming also reduce water erosion. Returning crop residue to the soil maintains or improves organic matter content and fertility. Efficient use of irrigation water and uniform application rates are important.

This soil is suited to pasture and hay. Production can be improved or maintained and the soil protected from wind and water erosion by stocking at proper rates and rotating grazing. Fertilizing and growing a mixture of grasses and legumes increase production.

Range vegetation controls wind and water erosion. Overgrazing or improper haying methods reduce the protective cover and can allow severe wind erosion and creation of small blowouts, as well as decreasing the forage value of the vegetation. Proper grazing, deferred

grazing or haying, and use of a planned grazing system maintain or improve range condition.

Windbreaks have a good chance for survival and growth if moisture is adequate, wind erosion is controlled, and competition from weeds and grasses is eliminated. Where water is available, irrigation can supplement moisture during dry periods. Strips of sod between rows help to prevent wind erosion. Cultivation or use of approved herbicides controls weeds and grasses in tree rows.

Septic tank absorption fields function well in this soil. Sewage lagoons may seep unless sealed or lined. The walls or sides of shallow excavations may slough or cave in unless temporarily shored. This soil is suited to dwellings. Small commercial buildings can be designed to fit the slope, or the soil can be graded to an acceptable slope. Damage to roads and streets by frost action can be reduced by providing good surface drainage. Crowning the road by grading and constructing adequate side ditches help to provide the needed surface drainage.

This soil is in capability units IIIe-3 dryland and IIIe-8 irrigated, Sandy range site, and windbreak suitability group 5.

HeD—Hersh fine sandy loam, 6 to 11 percent slopes. This deep, strongly sloping, well drained soil is on side slopes of uplands and valleys. It formed in sandy and loamy eolian material. Individual areas range from 10 to 200 acres in size.

Typically, the surface layer is brown, very friable fine sandy loam about 7 inches thick. The next 4 inches is pale brown fine sandy loam. The underlying material is light gray fine sandy loam to a depth of 60 inches. In some areas the lower part of the underlying material is loamy fine sand.

Included with this soil in mapping are small areas of Gates soils in similar positions and Valentine soils in undulating areas. Gates soils are very fine sandy loam throughout. Valentine soils have more sand throughout. Inclusions make up 10 to 20 percent of the map unit.

Permeability is moderately rapid, and available water capacity is moderate. Runoff is rapid. Organic matter content and natural fertility are low. Water intake rate is moderately high.

Most of the acreage of this soil is farmed. Some is rangeland used for grazing.

If dryfarmed, this soil is poorly suited to grain sorghum, wheat, and alfalfa. Water and wind erosion are the main hazards. Where slopes are suitable, terraces and contouring reduce water erosion. Leaving crop residue on the surface controls wind and water erosion and conserves moisture. Returning crop residue or green manure crops to the soil maintains or improves organic matter content and natural fertility.

This soil is unsuitable for gravity irrigation and poorly suited to sprinkler irrigation of corn and of alfalfa and grasses for hay or pasture. Where slopes are suitable, terraces and contour farming reduce water erosion. Leaving crop residue on the surface helps to control wind and water erosion and conserves moisture. Limiting the use of row crops and growing close-grown crops, such as alfalfa and grasses, help to control erosion. Using water efficiently and controlling runoff are important when irrigating this soil.

This soil is suited to pasture and hay. Water erosion is a hazard. It can be controlled by such practices as terraces and adequate cover on the surface. Production can be improved or maintained by stocking at proper rates and rotating grazing. Introduced grasses respond to fertilizer and sprinkler irrigation. Irrigation water applications should be adjusted to the soil's water intake rate. Grazing should be delayed in spring and after irrigation until the soil surface is firm and grass has reached minimum height. Production can be increased by growing a mixture of grasses and legumes.

Range vegetation controls erosion, but overgrazing by livestock or improper haying methods reduce the protective cover and can allow severe wind erosion and creation of small blowouts, as well as decreasing the forage value of the vegetation. Proper grazing, deferred grazing or haying, and use of a planned grazing system maintain or improve range condition.

Windbreaks of adapted trees or shrubs have a good chance for survival and growth if they have adequate moisture, wind and water erosion are controlled, and competition from weeds and grasses is eliminated. Where water is available, irrigation can supplement moisture during dry periods. Strips of sod between rows help to prevent wind erosion. Planting rows on the contour or on terraces reduces water erosion. Cultivation or use of approved herbicides controls weeds and grasses in tree rows.

This soil is poorly suited to septic tank absorption fields because of the slope. For absorption fields to operate properly, the surface of the soil must be reshaped and the lines have to be installed on the contour. Slope must also be modified for sewage lagoons, and they should be sealed or lined to prevent seepage. Walls and sides of shallow excavations may slough or cave in unless shored. Dwellings and small commercial buildings can be designed to fit the slope, or the soil can be graded to an acceptable slope. Damage to roads and streets by frost action can be reduced by providing good surface drainage. Crowning the road by grading and constructing adequate side ditches help to provide the needed surface drainage. Cutting and filling provides a suitable grade for roads and streets.

This soil is in capability units IVe-3 dryland and IVe-8 irrigated, Sandy range site, and windbreak suitability group 5.

HeE—Hersh fine sandy loam, 11 to 15 percent slopes. This deep, moderately steep, well drained soil is

on upland side slopes. It formed in sandy and loamy eolian material. Individual areas range from 5 acres to several hundred acres in size.

Typically, the surface layer is brown, very friable fine sandy loam about 5 inches thick. The next 6 inches is light brownish gray fine sandy loam. The underlying material is pale brown fine sandy loam to a depth of 60 inches. In some areas the lower part of the underlying material is loamy fine sand.

Included with this soil in mapping are small areas of Gates and Valentine soils. Gates soils are very fine sand throughout. Valentine soils are more sandy. Inclusions make up 10 percent of the map unit.

Permeability is moderately rapid, and available water capacity is moderate. Runoff is rapid. Organic matter content and natural fertility are low. Water intake rate is moderately high.

Most of the acreage of this soil is rangeland used for grazing.

Generally, this soil is unsuitable for dryfarmed and irrigated crops, pasture, or hay because of the severe hazard of erosion.

This soil is suited to range. Range vegetation controls wind and water erosion. Overgrazing reduces the protective cover and decreases the forage value of the vegetation. Proper grazing, deferred grazing, and use of a planned grazing system maintain or improve range condition.

This soil is fair for trees and shrubs for windbreaks. Wind and water erosion are the main hazards. Trees should be planted in a shallow furrow with as little disturbance of the soil as possible to prevent wind erosion and covering of seedlings by drifting sand during high winds. Planting tree rows on the contour or terracing helps to prevent water erosion.

This soil is poorly suited to septic tank absorption fields because of the slope. For absorption fields to operate properly, the surface of the soil has to be reshaped and the lines have to be installed on the contour. Slope must also be modified for sewage lagoons, and they should be lined or sealed to prevent seepage. Walls and sides of excavations may slough or cave in unless shored. Dwellings and small commercial buildings can be designed to fit the slope, or the soil can be graded to an acceptable slope. Damage to roads and streets by frost action can be reduced by providing good surface drainage. Crowning the road by grading and constructing adequate side ditches help to provide the needed surface drainage. Cutting and filling provides a suitable grade for roads and streets.

This soil is in capability unit VIe-3 dryland, Sandy range site, and windbreak suitability group 5.

HhF—Hersh-Valentine complex, 15 to 30 percent slopes. These deep, steep soils are on uplands. The Hersh soil is somewhat excessively drained, and the Valentine soil is excessively drained. The Hersh soil formed in mixed sandy and loamy eolian material, and the Valentine soil formed in sandy eolian material. The Hersh soil makes up 30 to 45 percent of this map unit, and the Valentine soil makes up about 25 to 35 percent. Areas of the two soils are so intricately mixed that separating them in mapping is not practical. Individual areas of this complex range from 10 acres to several hundred acres in size.

Typically, the Hersh soil has a surface layer of grayish brown, very friable fine sandy loam about 5 inches thick. The next 7 inches is light brownish gray fine sandy loam. The underlying material is very pale brown fine sandy loam to a depth of 60 inches. In some areas the lower part of the underlying material is loamy fine sand.

Typically, the Valentine soil has a surface layer of grayish brown, loose loamy fine sand about 4 inches thick, The next 5 inches is pale brown loamy fine sand. The underlying material is very pale brown fine sand to a depth of 60 inches. In some places the surface layer is fine sand. In some places slope is more than 30 percent.

Included with these soils in mapping are small areas of Gates and Hobbs soils. Gates soils are very fine sandy loam throughout. Hobbs soils have less sand throughout, are occasionally flooded, and are on narrow bottom lands below the Hersh and Valentine soils. Inclusions make up 15 to 30 percent of the map unit.

Permeability is moderately rapid in the Hersh soil and rapid in the Valentine soil. Available water capacity is moderate in the Hersh soil and low in the Valentine soil. Runoff is rapid on the Hersh soil and slow on the Valentine soil. Organic matter content and natural fertility are low in both soils.

All of the acreage of this complex is rangeland used for grazing.

This unit is unsuitable for dryfarmed or irrigated crops, pasture, or hay because of the steep slope and severe erosion hazard. Steepness limits the planting of trees and shrubs in windbreaks.

These soils are suited to range. Maintaining a good stand of native grasses controls wind and water erosion. Overgrazing reduces the protective cover and decreases the forage value of the vegetation. It also can allow severe wind erosion and creation of small blowouts. Proper grazing, deferred grazing, and used of a planned grazing system maintain or improve range condition.

Other sites should be found for septic tank absorption fields, sewage lagoons, shallow excavations, and dwellings because of the steep slopes. Cutting and filling provides suitable grade for roads and streets.

These soils are in capability unit VIe-3 dryland and windbreak suitability group 10. The Hersh soil is in Sandy range site, and the Valentine soil is in Sands range site.

Hk—Hobbs silt loam, 0 to 2 percent slopes. This deep, nearly level, well drained soil is on narrow bottom lands. It formed in alluvium and is occasionally flooded.

Individual areas are long and narrow and range from 10 to 100 acres in size.

Typically, the surface layer is grayish brown, friable silt loam about 6 inches thick. The underlying material is stratified grayish brown and pale brown silt loam to a depth of 60 inches. In some places the profile contains strata of sandy or loamy material.

Included with this soil in mapping are areas of Cozad and Hord soils. Cozad and Hord soils are not stratified in the upper part of the profile. Inclusions make up as much as 10 percent of this map unit.

Permeability is moderate, and available water capacity is high. Runoff is slow. Tilth is good. Organic matter content is moderate, and natural fertility is high. Water intake rate is moderate.

Most of the acreage of this soil is farmed. Some areas are rangeland used for grazing or hay.

If dryfarmed, this soil is suited to corn, grain sorghum, wheat, and alfalfa. Flooding in spring may delay cultivation, but damage to crops is rarely severe. Deposition of silt may damage newly seeded crops. Diversions and drainage ditches intercept and divert runoff from adjacent soils. Conservation practices that reduce runoff on adjacent soils reduce flooding on this soil. Returning crop residue to the soil maintains or improves organic matter content and fertility.

If irrigated, this soil is suited to corn, grain sorghum, and alfalfa. Sprinkler or gravity irrigation systems can be used. Where this soil is adjacent to steep and very steep soils, irrigation may not be practical. Where the adjacent soils are gently sloping, center-pivot irrigation systems are practical. Diversions, drainage ditches, and conservation practices on adjacent soils reduce flooding and crop damage on this soil.

This soil is suited to pasture and hay. Deposition of silt and overgrazing reduce productivity. Production can be improved or maintained by stocking at proper rates and rotating grazing. Introduced grasses respond to fertilizer and irrigation. Grazing should be delayed in spring and after irrigation until the soil surface is firm and grass has reached minimum height. Production can be increased by growing a mixture of grasses and legumes.

This soil is suited to range for either grazing or haying. Overgrazing or improper haying methods decrease the forage value of the vegetation. Proper grazing and use of a planned grazing system maintain or improve range condition.

This soil is good for planting trees and shrubs for windbreaks. Weeds and grasses, which compete with trees and shrubs for moisture, can be controlled by cultivation or use of approved herbicides.

Other sites should be found for septic tank absorption fields, sewage lagoons, and dwellings to avoid the flooding. Local roads may be constructed on suitable, well compacted fill; adequate side ditches or culverts also protect the road from flooding. The surface material and base material of roads must be thick enough to compensate for the low strength of the soil. Using coarser-grained base material improves performance of paved roads.

This soil is in capability units IIw-3 dryland and IIw-6 irrigated, Silty Overflow range site, and windbreak suitability group 1.

Hm—Hobbs silt loam, channeled, 0 to 2 percent slopes. This deep, nearly level, well drained soil is on bottom lands. It formed in alluvium and is frequently flooded. Individual areas are long and narrow and are dissected by entrenched meandering stream channels. Areas range from 10 to 200 acres in size.

Typically, the surface layer is dark grayish brown, friable, stratified silt loam about 7 inches thick. The underlying material is light brownish gray, stratified silt loam to a depth of 60 inches. In some places the underlying material is stratified with sandy or loamy material. Some places are calcareous at the surface.

Included with this soil in mapping are small areas between channels of Cass, Cozad, and Hord soils. Cass soils have more sand throughout. Cozad and Hord soils lack stratification in the upper part of the profile. Inclusions make up 5 to 15 percent of the map unit.

Permeability is moderate, and available water capacity is high. Runoff is slow. Some areas have a seasonal high water table between depths of 4 and 8 feet. Organic matter content is moderate, and natural fertility is high.

Most of the acreage of this soil is in native grass, trees, and shrubs. It is used for grazing and provides good habitat for many types of wildlife.

This soil is unsuitable for dryfarmed or irrigated crops, pasture, or hay because of the entrenched meandering stream channels, inaccessibility, and flooding.

This soil is suited to range for grazing. Overgrazing and deposition of silt decrease the forage value of the vegetation. Proper grazing and use of a planned grazing system maintain or improve range condition.

This soil is generally not suitable for trees and shrubs for windbreaks because of the excessive slope along the stream channels and the frequent flooding.

This soil is unsuitable for septic tank absorption fields, sewage lagoons and dwellings because of frequent flooding and low strength. Other sites should be found. Local roads and streets can be constructed on suitable, well compacted fill above the flood level. Culverts or bridges are needed where roads cross stream channels. The surface material and base material of roads must be thick enough to compensate for the low strength of the soil. Using coarser grained base material improves performance of paved roads.

This soil is in capability unit VIw-7 dryland, Silty Overflow range site, and windbreak suitability group 10.

HoB—Holdrege silt loam, 1 to 3 percent slopes. This deep, very gently sloping, well drained soil is on

uplands. It formed in loess. Individual areas range from 10 to 50 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 9 inches thick. The subsoil is about 18 inches thick. It is grayish brown silty clay loam in the upper part, brown silty clay loam in the middle part, and pale brown silt loam in the lower part. The underlying material is very pale brown, calcareous silt loam to a depth of 60 inches. In some places the dark color extends to a depth of more than 20 inches.

Included with this soil in mapping are areas of Hord soils in slightly lower positions. Hord soils have dark colors to a greater depth and have less clay in the subsoil. Inclusions make up 5 to 15 percent of the map unit.

Permeability is moderate, and available water capacity is high. Runoff is slow. Organic matter content is moderate, and natural fertility is high. Water intake rate is moderately low.

Most of the acreage of this soil is farmed.

If dryfarmed, this soil is suited to corn, grain sorghum, wheat, and alfalfa. Water erosion is the main hazard. Terraces, contour farming, and leaving crop residue on the surface help to prevent erosion and conserve moisture. Returning crop residue to the soil maintains or improves organic matter content and natural fertility.

If irrigated, this soil is suited to corn and alfalfa. Terraces, contour farming, contour bench leveling, and conservation tillage that leaves crop residue on the surface help to prevent erosion. Where adjacent soils are more sloping, center-pivot sprinkler irrigation systems are commonly used. These systems allow good control of application rates and uniform distribution of water. Gravity systems can also be used. Land leveling or contour bench leveling reduces the grade and allows efficient use of irrigation water. Returning crop residue to the soil maintains or improves organic matter content and fertility.

This soil is suited to pasture and hay. Production can be improved or maintained by stocking at proper rates and rotating grazing. Introduced grasses respond to fertilizer and irrigation. Grazing should be delayed in spring and after irrigation until the soil surface is firm and grass has reached minimum height. Production can be increased by growing a mixture of grasses and legumes.

This soil is suited to trees and shrubs for windbreaks. Seedlings generally survive and grow if competing weeds and grasses are controlled by good site preparation and by timely cultivation or use of approved herbicides. A cover crop between rows helps to prevent erosion.

This soil is suited to septic tank absorption fields. Sewage lagoons should be sealed or lined to prevent seepage, and the soil can be graded to modify the slope. Backfilling with coarse material protects building foundations against shrinking and swelling of the soil. The surface material and base material of roads must be thick enough to compensate for the low strength of the soil. Using coarser-grained base material improves performance of paved roads.

This soil is in capability units IIe-1 dryland and IIe-4 irrigated, Silty range site, and windbreak suitability group 3.

HoC—Holdrege silt loam, 3 to 6 percent slopes. This deep, gently sloping, well drained soil is on uplands. It formed in loess. Individual areas range from 10 acres to several hundred acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 11 inches thick. The subsoil is about 24 inches thick. It is dark grayish brown silty clay loam in the upper part, light brownish gray silty clay loam in the middle part, and very pale brown silt loam in the lower part. The underlying material is light gray silt loam to a depth of 60 inches. In some areas the surface layer is thinner because of erosion. In some areas the dark color extends to a depth of more than 20 inches.

Included with this soil in mapping are small areas of Hord and Uly soils. Hord soils have a thicker dark colored surface layer and have less clay in the subsoil. Hord soils are generally in concave positions below Holdrege soils. Uly soils have less clay in the subsoil and are in higher areas or on side slopes adjacent to drainageways. Inclusions make up 5 to 20 percent of the map unit.

Permeability is moderate, and available water capacity is high. Runoff is medium. Organic matter content is moderate, and natural fertility is high. Water intake rate is moderately low.

Most of the acreage of this soil is rangeland. A few areas are farmed.

If dryfarmed, this soil is suited to corn, grain sorghum, wheat, and alfalfa. Water erosion is a hazard where the surface is not adequately protected by vegetation or crop residue. Terraces, contour farming, stripcropping, and conservation tillage help to prevent soil erosion and conserve moisutre. Returning crop residue and green manure crops to the soil maintains or improves organic matter content and fertility.

Under sprinkler irrigation systems, this soil is suited to corn, grain sorghum, and alfalfa and grasses for hay or pasture. This soil is not suited to gravity irrigation systems unless the slope can be reduced by land leveling or contour bench leveling. Terraces, contour farming, and conservation tillage that leaves crop residue on the surface help to prevent erosion. Erosion by wind and water also can be reduced by growing close-grown crops such as alfalfa and grasses for hay or pasture. Using water efficiently and controlling runoff are important. Returning crop residue to the soil maintains or improves organic matter content and fertility.

This soil is suited to pasture and hay. Water erosion can be controlled by such conservation practices as terraces and adequate cover on the surface. Production can be improved or maintained by stocking at proper

rates and rotating grazing. Introduced grasses respond to fertilizer and sprinkler irrigation. Irrigation water applications should not exceed the soil's water intake rate. Grazing should be delayed in spring and after irrigation until the soil surface is firm and grass has reached minimum height. Production can be increased by growing a mixture of grasses and legumes.

Range vegetation controls water erosion. Overgrazing or improper haying methods reduce the protective cover and decrease the forage value of the vegetation. Proper grazing, deferred grazing or haying, and use of a planned grazing system maintain or improve range condition.

This soil is suited to trees and shrubs for windbreaks. Water erosion is the main hazard to establishing seedlings. Planting trees and shrubs on the contour or terracing controls water erosion. Seedlings generally survive and grow well if competing vegetation is controlled or removed by good site preparation and timely cultivation or use of approved herbicides. If water is available, supplemental irrigation can provide extra moisture.

This soil is suited to septic tank absorption fields. Sewage lagoons should be sealed or lined to prevent seepage, and the soil should be graded to modify the slope. Backfilling with coarse material protects building foundations against shrinking and swelling of the soil. The surface material and base material of roads must be thick enough to compensate for the low strength of the soil. Using coarser-grained base material improves performance of paved roads.

This soil is in capability units IIIe-1 dryland and IIIe-4 irrigated, Silty range site, and windbreak suitability group 3.

HoC2—Holdrege silty clay loam, 3 to 6 percent slopes, eroded. This deep, gently sloping, well drained soil is on uplands. It formed in loess. Some or all of the original surface layer has been removed by erosion and the remaining surface layer has been mixed with the subsoil by cultivation. Individual areas range from 10 acres to several hundred acres in size.

Typically, the surface layer is brown, firm silty clay loam about 6 inches thick. The subsoil is silty clay loam about 19 inches thick. It is brown in the upper part, pale brown in the middle part, and very pale brown in the lower part. The underlying material is very pale brown silt loam to a depth of 60 inches. In some areas the surface layer is not eroded and is thicker.

Included with this soil in mapping are small areas of Coly, Hord, and Uly soils. Coly and Uly soils are commonly on narrow ridgetops and adjacent to drainageways. Hord soils have less clay in the subsoil and are generally in concave areas below Holdrege soils. Uly soils have less clay in the subsoil. Coly soils are calcareous higher in the profile. Inclusions make up 10 to 20 percent of the map unit.

Permeability is moderate, and available water capacity is high. Runoff is medium. Tilth may be poor because of the silty clay loam surface layer. Organic matter content is moderately low, and natural fertility is high. Water intake rate is low.

Most of the acreage of this soil is farmed.

If dryfarmed, this soil is suited to corn, grain sorghum, wheat, and alfalfa. Water erosion is a hazard where the surface is not adequately protected by vegetation or crop residue. Terraces, contour farming, and conservation tillage help to prevent soil erosion and conserve moisture. Returning crop residue and green manure crops to the soil maintains or improves organic matter content and fertility.

Under sprinkler irrigation, this soil is suited to corn, grain sorghum, and alfalfa. This soil is not suited to gravity irrigation systems unless the slope can be reduced by land leveling. Water erosion can be reduced by terracing, contour farming, conservation tillage, and growing close-grown crops like alfalfa and grasses for hay or pasture. Using water efficiently and controlling runoff are important. Returning crop residue to the soil maintains or improves organic matter content and fertility.

This soil is suited to pasture and hay. Water erosion can be controlled by such conservation practices as terraces and adequate cover on the surface. Production can be improved or maintained by stocking at proper rates and rotating grazing. Introduced grasses respond to fertilizer and sprinkler irrigation. Irrigation water applications should not exceed the soil's water intake rate. Grazing should be delayed in spring and after irrigation until the soil surface is firm and grass has reached minimum height. Production can be increased by growing a mixture of grasses and legumes.

Range vegetation controls water erosion. Overgrazing or improper haying methods reduce the protective cover and reduce the forage value of the vegetation. Proper grazing, deferred grazing or haying, and use of a planned grazing system maintain or improve range condition.

This soil is suited to trees and shrubs for windbreaks. Water erosion and lack of moisture are the main hazards to establishing seedlings. Planting trees and shrubs on the contour or terracing controls water erosion. Water erosion can also be reduced by maintaining strips of sod or a cover crop between rows. Seedlings generally survive and grow well if competing vegetation is controlled or removed by good site preparation, timely cultivation, and use of approved herbicides. New plantings may need supplemental moisture during dry periods.

This soil is suited to septic tank absorption fields. Sewage lagoons should be sealed or lined to prevent seepage, and the soil should be graded to modify the slope. Backfilling with coarse material protects building foundations against shrinking and swelling of the soil. Small commercial buildings can be designed to fit the

slope, or the soil can be graded to an acceptable slope. The surface material and base material of roads must be thick enough to compensate for the low strength of the soil. Using coarser grained base material improves performance of paved roads.

This soil is in capability units IIIe-8 dryland and IIIe-3 irrigated, Silty range site, and windbreak suitability group 3.

HoD—Holdrege silt loam, 6 to 11 percent slopes. This deep, strongly sloping, well drained soil is on uplands. It formed in loess. Individual areas range from 10 to 100 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 10 inches thick. The subsoil is about 22 inches thick. The subsoil is dark grayish brown silty clay loam in the upper part, brown silty clay loam in the middle part, and very pale brown silt loam in the lower part. The underlying material is light gray silt loam to a depth of 60 inches. In some areas the surface layer is thinner because of erosion. In some areas the dark color extends to a depth of more than 20 inches.

Included with this soil in mapping are small areas of Coly and Uly soils on narrow ridgetops and side slopes. Coly soils are less developed and are calcareous at or near the surface. Uly soils have less clay in the subsoil. Inclusions make up 10 to 20 percent of the map unit.

Permeability is moderate, and available water capacity is high. Runoff is medium. Organic matter content is moderate, and natural fertility is high. Water intake rate is moderately low.

Most of the acreage of this soil is rangeland used for grazing. A few areas are farmed.

If dryfarmed, this soil is poorly suited to corn, grain sorghum, wheat, and alfalfa. The water erosion hazard is severe if the soil surface is not adequately protected by vegetation or crop residue. Terraces, contour farming, and leaving crop residue on the surface help to control erosion and conserve moisture. Returning crop residue and green manure crops to the soil maintains or improves organic matter content and fertility.

If irrigated, this soil is poorly suited to corn, grain sorghum, and alfalfa and grasses for hay and pasture. This soil is not suited to gravity irrigation systems, but sprinkler systems may be used with careful management. Terraces, contour farming, and conservation tillage that leaves crop residue on the surface helps to prevent erosion. Erosion in the wheel tracks can be a problem. Adjusting the rate of water application to the soil's moderately low water intake rate helps to prevent runoff and erosion.

This soil is suited to pasture and hay. Water erosion can be controlled by such conservation practices as terraces and adequate cover on the surface. Production can be improved or maintained by stocking at proper rates and rotating grazing. Introduced grasses respond to fertilizer and sprinkler irrigation. Irrigation water applications should not exceed the soil's water intake rate. Grazing should be delayed in spring and after irrigation until the soil surface is firm and grass has reached minimum height. Production can be increased by growing a mixture of grasses and legumes.

Range vegetation controls water erosion. Overgrazing or improper haying methods reduce the protective cover and can allow severe water erosion, as well as decreasing the forage value of the vegetation. Proper grazing, deferred grazing or haying, and use of a planned grazing system maintain or improve range condition.

This soil is suited to trees and shrubs for windbreaks. Water erosion and droughtiness are the main hazards to establishing seedlings. Planting trees and shrubs on the contour or terracing controls water erosion. Erosion can also be reduced by maintaining strips of sod or a cover crop between rows. Seedlings generally survive and grow well if competing vegetation is controlled or removed by good site preparation and timely cultivation or use of approved herbicides. New plantings may need supplemental moisture during dry periods.

For proper operation of septic tank absorption fields, the surface has to be reshaped and the lines have to be installed on the contour. Sewage lagoons also require extensive grading to modify the slope. Backfilling with coarse material protects building foundations against shrinking and swelling of the soil. Dwellings and small commercial buildings can be designed to fit the slope, or the soil can be graded to an acceptable slope. The surface material and base material of roads must be thick enough to compensate for the low strength of the soil. Using coarser grained base material improves performance of paved roads.

This soil is in capability unit IVe-1 dryland and IVe-4 irrigated, Silty range site, and windbreak suitability group 3.

HoD2—Holdrege silty clay loam, 6 to 11 percent slopes, eroded. This deep, strongly sloping, well drained soil is on uplands. It formed in loess. Some or all of the original surface layer has been removed by erosion and the remaining surface layer has been mixed with the subsoil by cultivation. Individual areas range from 10 to 200 acres in size.

Typically, the surface layer is grayish brown, firm silty clay loam about 5 inches thick. The subsoil is about 8 inches thick. It is light brownish gray silty clay loam in the upper part and light gray silt loam in the lower part. The underlying material is light gray silt loam to a depth of 60 inches. In some places the surface layer has not been eroded and is silt loam in texture and is thicker.

Included with this soil in mapping are areas of Coly and Uly soils. Coly soils are less developed and are calcareous at or near the surface. Uly soils have less clay in the subsoil. Inclusions make up 15 to 25 percent of the map unit.

Permeability is moderate, and available water capacity is high. Runoff is medium. Organic matter content is moderately low, and natural fertility is medium. Water intake rate is low.

Most of the acreage of this soil is dryfarmed. Some areas are irrigated, mainly with center-pivot sprinkler systems.

If dryfarmed, this soil is poorly suited to corn, grain sorghum, wheat, and alfalfa. Water erosion can be serious if the soil surface is not adequately protected by vegetation or crop residue. Terraces, contour farming, and leaving crop residue on the surface help to control erosion and conserve mositure. Returning crop residue and green manure crops to the soil maintains or improves organic matter content and fertility.

If irrigated, this soil is poorly suited to corn, grain sorghum, and alfalfa. This soil is not suited to gravity irrigation systems, but sprinkler systems can be used with careful management. Center-pivot sprinkler systems are the most common. Water erosion in the wheel tracks can be a problem. Terraces, contour farming, and conservation tillage that leaves crop residue on the surface helps to prevent erosion. Adjusting the rate of water application to the soil's low intake rate helps to prevent runoff and water erosion. Limiting the use of row crops and growing close-grown crops like alfalfa and grass also help to reduce runoff and water erosion.

This soil is suited to pasture and hay. Water erosion can be reduced by such conservation practices as terraces and maintaining adequate cover on the surface. Production can be improved or maintained by stocking at proper rates and rotating grazing. Introduced grasses respond to fertilizer and sprinkler irrigation. Irrigation water applications should not exceed the soil's water intake rate. Grazing should be delayed in spring and after irrigation until the soil surface is firm and grass has reached minimum height. Production can be increased by growing a mixture of grasses and legumes.

Range vegetation controls water erosion. Overgrazing or improper haying methods reduce the protective cover and can allow severe water erosion, as well as decreasing the forage value of the vegetation. Proper grazing, deferred grazing or haying, and use of a planned grazing system maintain or improve range condition.

This soil is suited to trees and shrubs for windbreaks. Water erosion and lack of moisture are the main hazards to establishing seedlings. Seedlings generally survive and grow well if competing vegetation is controlled or removed by good site preparation and timely cultivation or use of approved herbicides. If water is available, supplemental irrigation can provide moisture during dry periods. Planting trees and shrubs on the contour or terracing controls water erosion. Water erosion can also be reduced by maintaining strips of sod or a cover crop between rows.

For proper operation of septic tank absorption fields, the surface of the soil has to be reshaped and the lines have to be installed on the contour. Sewage lagoons also require extensive grading to modify the slope. Dwellings and small commercial buildings can be designed to accommodate the slope, or the soil can be graded to an acceptable slope. Strengthening building foundations and backfilling with coarse material prevent damage from shrinking and swelling of the soil. The surface material and base material of roads must be thick enough to compensate for the low strength of the soil. Using coarser grained base material improves performance of paved roads.

This soil is in capability units IVe-8 dryland and IVe-3 irrigated, Silty range site, and windbreak suitability group 3.

HpB—Hord fine sandy loam, 0 to 3 percent slopes. This deep, nearly level and very gently sloping, well drained soil is on stream terraces. It formed in alluvium. This soil is rarely flooded. Individual areas range from 10 to 100 acres in size.

Typically, the surface layer is very friable fine sandy loam about 21 inches thick. It is dark grayish brown in the upper part and grayish brown in the lower part. The subsoil is pale brown silt loam about 11 inches thick. The underlying material is light gray silt loam to a depth of 60 inches. In some places the surface layer is silt loam. The surface layer in some areas is thinner and lighter in color.

Included with this soil in mapping are small areas of Anselmo and Cozad soils. Anselmo soils are fine sandy loam throughout. Cozad soils have less clay throughout. Inclusions make up 5 to 15 percent of the map unit.

Permeability is moderate, and available water capacity is high. Runoff is slow. Tilth is good. Organic matter content is moderate, and natural fertility is high. Water intake rate is moderate.

Most of the acreage of this soil is farmed.

If dryfarmed, this soil is suited to corn, grain sorghum, wheat, and alfalfa. Wind erosion is the major hazard where the surface is not adequately protected by vegetation or crop residue. Conservation tillage practices, such as minimum tillage, help to prevent wind erosion and conserve mositure. Returning crop residue to the soil maintains or improves organic matter content and fertility.

If irrigated, this soil is suited to corn and alfalfa. Leaving crop residue on the surface helps to prevent erosion. Land leveling establishes suitable grades for gravity irrigation systems. Sprinkler irrigation can be used effectively on this soil. Efficiently using water and controlling runoff are important.

This soil is suited to pasture and hay. Production can be improved or maintained by stocking at proper rates and rotating grazing. Introduced grasses respond to fertilizer and irrigation. Grazing should be delayed in spring and after irrigation until the soil surface is firm and

grass has reached minimum height. Production can be increased by growing a mixture of grasses and legumes.

Range vegetation reduces wind erosion. Overgrazing or improper haying methods reduce the protective cover and decrease the forage value of the vegetation. Proper grazing and deferred grazing or haying maintain or improve range condition.

This soil is suited to trees and shrubs for windbreaks. Seedlings generally survive and grow if competing vegetation is controlled or removed by good site preparation and timely cultivation between tree rows or use of approved herbicides. Maintaining strips of sod or a cover crop between rows helps to prevent wind erosion. Supplemental moisture may be needed in dry periods while windbreaks are being established.

Septic tank absorption fields function well if protected from flooding. Sewage lagoons may seep unless sealed or lined. Dwellings and buildings can be constructed on elevated, well compacted fill material above floods. The surface material and base material of roads must be thick enough to compensate for the low strength of the soil. Using coarser grained base material improves performance of paved roads.

This soil is in capability units IIe-3 dryland and IIe-5 irrigated, Silty Lowland range site, and windbreak suitability group 3.

Hr—Hord silt loam, 0 to 1 percent slopes. This deep, nearly level, well drained soil is on uplands and in valleys. It formed in loess. Individual areas range from 10 to 100 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 17 inches thick. The subsoil is dark grayish brown silt loam about 11 inches thick. The underlying material is silt loam to a depth of 60 inches. The upper part is light brownish gray, and the lower part is very pale brown. In some places the surface layer is thinner and lighter in color.

Included with this soil in mapping are small areas of Hall and Hobbs soils. Hall soils are in similar positions and have more clay in the subsoil. Hobbs soils are along narrow drainageways and are stratified. Inclusions make up 10 to 20 percent of the map unit.

Permeability is moderate, and available water holding capacity is high. Runoff is slow. Tilth is good. Organic matter content is moderate, and natural fertility is high. Water intake rate is moderate.

Most of the acreage of this soil is farmed under irrigation.

If dryfarmed, this soil is suited to corn, grain sorghum, wheat, and alfalfa. Lack of moisture is a concern during periods of low rainfall. Conservation tillage practices that leave residue on the surface conserve moisture.

If irrigated, this soil is suited to corn and alfalfa. Gravity or sprinkler irrigation systems can be used effectively. Conservation tillage that leaves crop residue on the surface conserves moisture. Efficient water use is a concern.

This soil is suited to pasture and hay. Production can be improved or maintained by stocking at proper rates and rotating grazing. Introduced grasses respond to fertilizer and irrigation. Grazing should be delayed in spring and after irrigation until the soil surface is firm and grass has reached minimum height. Production can be increased by growing a mixture of grasses and legumes.

This soil is suited to trees and shrubs for windbreaks. Weeds and grasses, which compete with trees and shrubs for moisture, can be controlled by good site preparation and by timely cultivation or use of approved herbicides.

Septic tank absorption fields function well in this soil. Sewage lagoons may seep unless lined or sealed. This soil is suited to dwellings and small commercial buildings. The surface material and base material of roads must be thick enough to compensate for the low strength of the soil. Using coarser grained base material improves performance of paved roads.

This soil is in capability units IIc-1 dryland and I-6 irrigated, Silty Lowland range site, and windbreak suitability group 3.

HrB—Hord silt loam, 1 to 3 percent slopes. This deep, very gently sloping, well drained soil is on uplands and in valleys. It formed in loess. Individual areas range from 10 to 200 acres in size.

Typically, the surface layer is friable silt loam about 12 inches thick. It is grayish brown in the upper part and dark grayish brown in the lower part. The subsoil is silt loam about 18 inches thick. It is grayish brown in the upper part and pale brown in the lower part. The underlying material is light gray silt loam to a depth of 60 inches. In some places the surface layer is thinner or lighter in color.

Included with this soil in mapping are small areas of Hall and Hobbs soils. Hall soils are in similar positions and have more clay in the subsoil. Hobbs soils are on narrow drainageways and are stratified. Inclusions make up 10 to 20 percent of the map unit.

Permeability is moderate, and available water capacity is high. Runoff is medium. Tilth is good. Organic matter content is moderate, and natural fertility is high. Water intake rate is moderate.

Most of the acreage of this soil is farmed.

If dryfarmed, this soil is suited to corn, grain sorghum, wheat, and alfalfa. Water erosion is a hazard if the soil surface is not protected by vegetation or crop residue. Terraces, contour farming, and conservation tillage practices, such as minimum tillage, reduce water erosion and conserve moisture.

If irrigated, this soil is suited to corn and alfalfa. Conservation tillage practices, such as minimum tillage, help to reduce water erosion. Gravity or sprinkler irrigation systems can be used. Land leveling or contour

bench leveling establishes a suitable grade for gravity systems. Under sprinklers, terraces and contour farming help to control water erosion. Using water efficiently and controlling runoff are important.

This soil is suited to pasture and hay. Production can be improved or maintained by stocking at proper rates and rotating grazing. Introduced grasses respond to fertilizer and irrigation. Grazing should be delayed in spring and after irrigation until the soil surface is firm and grass has reached minimum height. Production can be increased by growing a mixture of grasses and legumes.

This soil is suited to trees and shrubs for windbreaks. Seedlings generally survive and grow if competing vegetation is controlled or removed by good site preparation and timely cultivation between tree rows or use of approved herbicides. Irrigation can supplement moisture in dry periods while windbreaks are being established.

Septic tank absorption fields function well in this soil. Sewage lagoons should be sealed or lined to prevent seepage, and the surface should be graded to modify the slope. This soil is suited to dwellings and small commercial buildings. The surface material and base material of roads must be thick enough to compensate for the low strength of the soil. Using coarser grained base material improves performance of paved roads.

This soil is in capability units IIe-1 dryland and IIe-6 irrigated, Silty Lowland range site, and windbreak suitability group 3.

HrC—Hord silt loam, 3 to 6 percent slopes. This deep, gently sloping, well drained soil is on foot slopes of uplands. It formed in loess or colluvium. Individual areas are generally long and narrow and range from 15 to 50 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 17 inches thick. The subsoil is about 26 inches thick. It is brown silt loam in the upper part and light brownish gray silt loam in the lower part. The underlying material is light gray silt loam to a depth of 60 inches. In some places the surface layer is very fine sandy loam or is thinner.

Included with this soil in mapping are small areas of Holdrege and Uly soils. Holdrege and Uly soils have dark colors to a depth of less than 20 inches. Holdrege soils have more clay in the subsoil. Inclusions make up 10 to 20 percent of the map unit.

Permeability is moderate, and available water capacity is high. Runoff is medium. Tilth is good. Organic matter content is moderate, and natural fertility is high. Water intake rate is moderate.

Most of the acreage of this soil is farmed.

If dryfarmed, this soil is suited to corn, grain sorghum, alfalfa, and wheat. Water erosion is a hazard. Terraces, contour farming, and leaving crop residue on the surface help to prevent erosion and conserve soil moisture.

Under sprinkler irrigation, this soil is suited to corn and alfalfa. Center-pivot sprinkler systems are the most common. This soil is generally not suited to gravity systems. Terraces, contour farming, and conservation tillage that leaves crop residue on the surface help to prevent erosion. Efficiently using water and controlling runoff are important.

This soil is suited to pasture and hay. Production can be improved or maintained by stocking at proper rates and rotating grazing. Introduced grasses respond to fertilizer and sprinkler irrigation. Irrigation water applications should not exceed the soil's water intake rate. Grazing should be delayed in spring and after irrigation until the soil surface is firm and grass has reached minimum height. Production can be increased by growing a mixture of grasses and legumes.

Rangeland vegetation controls water erosion. Overgrazing or improper haying methods reduce the protective cover and decrease the forage value of the vegetation. Proper grazing and deferred grazing or haying maintain or improve range condition.

This soil is suited to trees and shrubs for windbreaks. Seedlings generally survive and grow if competing vegetation is controlled or removed by good site preparation and by timely cultivation between tree rows. Irrigation can supplement moisture in dry periods while windbreaks are being estabished.

Septic tank absorption fields function well in this soil. Sewage lagoons should be lined or sealed to prevent seepage, and the surface should be graded to modify the slope. This soil is suited to dwellings. Small commercial buildings can be designed to fit the slope, or the soil can be graded to an acceptable slope. The surface material and base material of roads must be thick enough to compensate for the low strength of the soil. Using coarser grained base material improves performance of paved roads.

This soil is in capability units IIIe-1 dryland and IIIe-6 irrigated, Silty range site, and windbreak suitability group 3.

Ht—Hord silt loam, terrace, 0 to 1 percent slopes. This deep, nearly level, well drained soil is on stream terraces. It formed in alluvium. This soil is rarely flooded. Individual areas range from 10 to 300 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 17 inches thick. The subsoil is friable silt loam about 28 inches thick. It is dark grayish brown in the upper part and light brownish gray in the lower part. The underlying material is very pale brown, calcareous silt loam to a depth of 60 inches. In some places the surface layer is thinner. In some places the subsoil contains more clay.

Included with this soil in mapping are small areas of Hobbs soils in slightly lower positions. They are stratified. Inclusions make up 5 to 15 percent of the map unit.

Permeability is moderate, and available water capacity is high. Runoff is slow. Tilth is good. Organic matter content is moderate, and natural fertility is high. Water intake rate is moderate.

Nearly all of the acreage of this soil is farmed under irrigation.

If dryfarmed, this soil is suited to corn, grain sorghum, wheat, and alfalfa. Alfalfa may receive additional moisture from the water table, which is between 6 and 15 feet below the surface in some areas. Leaving residue on the surface conserves moisture.

If irrigated, this soil is suited to corn and alfalfa. Gravity or sprinkler irrigation systems can be used effectively. Efficient water use is a concern.

This soil is suited to pasture and hay. Production can be improved or maintained by stocking at proper rates and rotating grazing. Introduced grasses respond to fertilizer and irrigation. Grazing should be delayed in spring and after irrigation until the soil surface is firm and grass has reached minimum height. Production can be increased by growing a mixture of grasses and legumes.

This soil is suited to trees and shrubs for windbreaks. Some species of trees may receive additional moisture from the water table, which is between 6 and 15 feet below the surface in some places. Competition for moisture from weeds and grasses can be controlled by good site preparation and by timely cultivation or use of approved herbicides.

Septic tank absorption fields should be protected from flooding. Pollution of ground water is a concern in some areas. Sewage lagoons may seep unless sealed or lined. Dwellings and buildings can be constructed on elevated, well compacted fill above the flood level. The surface material and base material of roads must be thick enough to compensate for the low strength of the soil. Using coarser grained base material improves performance of paved roads.

This soil is in capability units IIc-1 dryland and I-6 irrigated, Silty Lowland range site, and windbreak suitability group 1.

HtB—Hord silt loam, terrace, 1 to 3 percent slopes. This deep, very gently sloping, well drained soil is on stream terraces. It formed in alluvium. This soil is rarely flooded. Individual areas range from 10 to 300 acres in size.

Typically, the surface layer is friable silt loam about 13 inches thick. It is grayish brown in the upper part and dark grayish brown in the lower part. The subsoil is about 19 inches thick. It is grayish brown silt loam in the upper part and pale brown silt loam in the lower part. The underlying material is light gray silt loam to a depth of 60 inches. In some places the surface layer is thinner or the subsoil contains more clay.

Included with this soil in mapping in slightly lower positions are small areas of Hobbs soils. Hobbs soils are stratified in the upper part. Inclusions make up 10 to 20 percent of the map unit.

Permeability is moderate, and available water capacity is high. Runoff is medium. Tilth is good. Organic matter content is moderate, and natural fertility is high. Water intake rate is moderate.

Nearly all of the acreage of this soil is farmed under irrigation. Some areas are dryfarmed.

If dryfarmed, this soil is suited to corn, grain sorghum, wheat, and alfalfa. Alfalfa may receive additional moisture from the water table, which is between 6 and 15 feet below the surface in some areas. Erosion by wind and water is a hazard if the soil surface is not protected by vegetation or crop residue. Terraces, contour farming, and conservation tillage practices, such as minimum tillage, help to prevent erosion and conserve moisture.

If irrigated, this soil is suited to corn and alfalfa. Gravity or sprinkler irrigation systems can be used. Land leveling or contour bench leveling establishes a suitable grade for gravity systems. Using water efficiently and controlling runoff are important. Terraces, contour farming, and conservation tillage that leaves crop residue on the surface helps to prevent erosion.

This soil is suited to pasture and hay. Production can be improved or maintained by stocking at proper rates and rotating grazing. Introduced grasses respond to fertilizer and irrigation. Grazing should be delayed in spring and after irrigation until the soil surface is firm and grass has reached minimum height. Production can be increased by growing a mixture of grasses and legumes.

This soil is suited to trees and shrubs in windbreaks. Some species of trees may receive additional moisture from the water table, which is between 6 and 15 feet below the surface in some areas. Seedlings generally survive and grow if competing vegetation is controlled or removed by good site preparation and timely cultivation between tree rows or use of approved herbicides. Irrigation can supplement moisture in dry periods while windbreaks are being established.

Septic tank absorption fields function well if protected from flooding, but pollution of ground water is a concern in some areas. Sewage lagoons should be sealed or lined to prevent seepage, and the surface should be graded to modify the slope. Dwellings and buildings can be constructed on elevated, well compacted fill above the flood level. The surface material and base material of roads must be thick enough to compensate for the low strength of the soil. Using coarser grained base material improves performance of paved roads.

This soil is in capability units IIe-1 dryland and IIe-6 irrigated, Silty Lowland range site, and windbreak suitability group 1.

InB—Inavale loamy fine sand, 0 to 3 percent slopes. This deep, nearly level and very gently sloping, somewhat excessively drained soil is on bottom lands

along major rivers. It formed in sandy alluvium. This soil is occasionally flooded. Individual areas range from 10 to 100 acres in size.

Typically, the surface layer is light brownish gray, loose loamy fine sand about 6 inches thick. The next 4 inches is very pale brown, stratified fine sand. The underlying material is light gray, stratified fine sand to a depth of 60 inches. In some areas the surface layer is fine sandy loam or fine sand and the seasonal high water table rises above a depth of 6 feet.

Included with this soil in mapping are small areas of Cass and Dunday soils in slightly higher positions. Cass and Dunday soils have a thicker and darker surface layer and are well drained. Inclusions make up 5 to 15 percent of this map unit.

Permeability is rapid, and available water capacity is low. Runoff is slow because most of the rainfall enters the soil. The seasonal high water table is between depths of 6 feet in wet years and 15 feet in dry years. Organic matter content and natural fertility are low. Water intake rate is very high.

Nearly all of the acreage of this soil is rangeland. A few areas are farmed.

If dryfarmed, this soil is poorly suited to grain sorghum and wheat. Wind erosion and drought are the main hazards. Leaving crop residue on the surface controls wind erosion and conserves soil moisture. Returning crop residue to the soil maintains and improves organic matter content and fertility. Limiting the use of row crops and growing close-grown crops protect the soil and conserve moisture.

Under sprinkler irrigation, this soil is poorly suited to corn, grain sorghum, and alfalfa. This soil is not suited to gravity irrigation systems because of the very high water intake rate. The very high intake rate, low available water capacity, wind erosion, and occasional flooding are the main limitations. Careful application rates and timely application of irrigation water by sprinklers help to overcome the problems caused by the intake rate and available water capacity. Leaving crop residue on the soil surface helps to prevent wind erosion and conserves soil moisture. Returning crop residue and green manure crops to the soil maintains and improves organic matter content and fertility.

This soil is poorly suited to pasture and hay. Production can be improved or maintained and the soil protected from wind by stocking at proper rates and rotating grazing. Fertilizing and growing a mixture of grasses and legumes increase production.

Range vegetation controls wind erosion. Overgrazing reduces the protective cover and decreases the forage value of the vegetation. Proper grazing and deferred grazing maintain or improve range condition.

This soil is fair for planting trees and shrubs for windbreaks. Survival and growth are fair. Wind erosion and competition for moisture from weeds and grasses are the main problems. Irrigation can supplement moisture in dry periods while windbreaks are being established. Wind erosion can be controlled by maintaining strips of sod or a cover crop between trees rows. Weeds and grasses can be controlled by cultivation and use of approved herbicides.

This soil is not suitable for septic tank absorption fields and sewage lagoons because of occasional flooding, seepage, and possible pollution of ground water. This soil is not suitable for dwellings because of occasional flooding. The walls and sides of shallow excavations may slough or cave in unless shored. Constructing roads on suitable, well compacted fill above the flood level and providing adequate side ditches and culverts help to protect roads from flood damage.

This soil is in capability units IVe-5 dryland and IIIe-11 irrigated, Sandy Lowland range site, and windbreak suitability group 5.

IpB—Ipage loamy fine sand, 0 to 3 percent slopes. This deep, nearly level and very gently sloping, moderately well drained soil is on stream terraces. It formed in eolian sand and reworked sandy alluvium. Individual areas are generally long and narrow and parallel the rivers. They range from 20 acres to several hundred acres in size.

Typically, the surface layer is grayish brown, loose loamy fine sand about 7 inches thick. The next 5 inches is grayish brown loamy fine sand. The underlying material is light gray, mottled fine sand to a depth of 60 inches. In some areas the surface layer is fine sandy loam.

Included with this soil in mapping are small areas of Hersh and Valentine soils on low ridges above the Ipage soil. Hersh soils are fine sandy loam throughout and are well drained. Valentine soils are excessively drained. Inclusions make up 5 to 15 percent of this map unit.

Permeability is rapid, and available water capacity is low. Runoff is slow because most of the rainfall enters the soil. The seasonal high water table is between depths of 3 feet in wet years and 6 feet in dry years. Organic matter content and natural fertility are low. Water intake rate is very high.

Most of the acreage of this soil is rangeland used for grazing. A few areas are farmed under sprinkler irrigation.

If dryfarmed, this soil is poorly suited to grain sorghum, wheat, and alfalfa. Alfalfa may obtain moisture from the water table. Wind erosion and drought are the main hazards. Stripcropping, field windbreaks, and leaving crop residue on the surface help to prevent erosion and conserve moisture. Returning crop residue to the soil maintains and improves organic matter content and fertility. Limiting use of row crops and growing close-grown crops protect the soil from wind.

Under sprinkler irrigation, this soil is poorly suited to corn, grain sorhum, alfalfa, and grasses and legumes for hay or pasture. This soil is not suited to gravity irrigation.

The very high intake rate and low available water capacity are the main limitations for irrigated crops. Wind erosion is also a hazard. Careful application rates and timely application of irrigation water by sprinklers helps to overcome the problems caused by the water intake rate and available water capacity. Leaving crop residue on the soil surface helps to prevent wind erosion and conserves soil moisture. Returning crop residue and green manure crops to the soil maintains and improves organic matter content and fertility.

This soil is poorly suited to pasture and hay. Production can be improved or maintained and the soil protected from wind by stocking at proper rates and rotating grazing. Fertilizing and growing a mixture of grasses and legumes increase production.

Range vegetation controls wind erosion. Overgrazing or improper haying methods reduce the protective cover and decrease the forage value of the vegetation. Proper grazing and deferred grazing or haying maintain or improve range condition.

This soil is good for planting trees and shrubs for windbreaks. Survival and growth are fair. Wind erosion and competition for moisture from weeds and grasses are the main concerns in management. Irrigation can supplement moisture in dry periods while windbreaks are being established. Wind erosion can be controlled by maintaining strips of sod or a cover crop between tree rows. Weeds and grasses can be controlled by cultivation or use of approved herbicides.

This soil is not suitable for septic tank absorption fields and sewage lagoons because of wetness, seepage, and the possibility of polluting ground water. Other sites should be found. Wetness from the seasonal high water table limits dwellings with basements. Constructing them on raised, well compacted fill helps to avoid the wetness. The walls or sides of shallow excavations may slough or cave in unless shored. Damage to roads by frost action can be reduced by providing good surface drainage and by using a gravel moisture barrier in the subgrade. Crowning the road by grading and constructing adequate side ditches help to provide the needed surface drainage.

This soil is in capability units IVe-5 dryland and IIIe-11 irrigated, Sandy Lowland range site, and windbreak suitability group 5.

Ks—Kenesaw very fine sandy loam, 0 to 1 percent slopes. This deep, nearly level, well drained soil is in valleys and on uplands in the sand-loess transition areas. This soil formed in recent loess. Individual areas range from 10 to 300 acres in size.

Typically, the surface layer is grayish brown, friable very fine sandy loam about 10 inches thick. The subsoil is light brownish gray, friable very fine sandy loam about 7 inches thick. The underlying material is light gray very fine sandy loam to a depth of 60 inches. In some areas the surface layer and subsoil are silt loam.

Included with this soil in mapping are small areas of Graybert soils in slightly lower areas and Rusco soils in slight depressions. Graybert soils have a buried soil at a depth of 20 to 40 inches. Rusco soils have more clay in the subsoil and are moderately well drained. Inclusions make up 5 to 15 percent of the map unit.

Permeability is moderate, and available water capacity is high. Runoff is slow. Tilth is good. Organic matter content is moderate, and natural fertility is high. Water intake rate is moderate.

Nearly all of the acreage of this soil is farmed under irrigation.

If dryfarmed, this soil is suited to corn, grain sorghum, wheat, and alfalfa. Wind erosion is a hazard if the soil surface is not protected by vegetation or crop residue. Conservation tillage practices, such as minimum tillage, help to prevent erosion and conserve moisture.

If irrigated, this soil is suited to corn and alfalfa. Conservation tillage that leaves crop residue on the surface helps to reduce erosion. This soil is suited to both gravity and sprinkler irrigation systems. Efficiently using water and controlling runoff are important.

This soil is suited to pasture and hay. Production can be improved or maintained by stocking at proper rates and rotating grazing. Introduced grasses respond to fertilizer and irrigation. Grazing should be delayed in spring and after irrigation until the soil surface is firm and grass has reached minimum height. Production can be increased by growing a mixture of grasses and legumes.

This soil is suited to trees and shrubs for windbreaks. Seedlings generally survive and grow if competing vegetation is controlled or removed by good site preparation and timely cultivation between tree rows or use of approved herbicides. Maintaining strips of sod or a cover crop between rows helps to prevent wind erosion. Irrigation can supplement moisture in dry periods while windbreaks are being established.

This soil is suited to septic tank absorption fields. Sewage lagoons may seep unless sealed or lined. This soil provides good sites for dwellings and small commercial buildings. Damage to roads and streets by frost action can be reduced by providing good surface drainage. Crowning the road by grading and constructing adequate side ditches help to provide the needed surface drainage. The surface pavement and subbase of roads and streets must be thick enough to compensate for the low strength of the soil. Using coarser grained material for subgrade or base material improves performance.

This soil is in capability units IIc-1 dryland and I-6 irrigated, Silty range site, and windbreak suitability group 3.

KsB—Kenesaw very fine sandy loam, 1 to 3 percent slopes. This deep, very gently sloping, well drained soil is in valleys and on uplands in the sand-

loess transition areas. This soil formed in recent loess. Individual areas range from 10 to 200 acres in size.

Typically, the surface layer is grayish brown, very friable very fine sandy loam about 10 inches thick. The subsoil is friable very fine sandy loam about 12 inches thick. It is light grayish brown in the upper part and light gray in the lower part. The underlying material is white very fine sandy loam to a depth of 60 inches. In some areas the surface layer and subsoil are silt loam.

Included with this soil in mapping are small areas of Graybert and Gates soils. Graybert soils have a buried soil at a depth of 20 to 40 inches. Gates soils do not have the dark colored surface layer. Inclusions make up 5 to 15 percent of the map unit.

Permeability is moderate, and available water capacity is high. Runoff is medium. Tilth is good. Organic matter content is moderate, and natural fertility is high. Water intake rate is moderate.

Nearly all of the acreage of this soil is farmed under irrigation.

If dryfarmed, this soil is suited to corn, grain sorghum, wheat, and alfalfa. Water and wind erosion are hazards if the soil surface is not protected by vegetation or crop residue. Terraces, contour farming, and conservation tillage practices, such as minimum tillage, help to prevent erosion and conserve moisture.

If irrigated, this soil is suited to corn and alfalfa. Terraces, contour farming, and conservation tillage that leaves crop residue on the surface help to reduce erosion. This soil is suited to both gravity and sprinkler irrigation systems. Land leveling or contour bench leveling establishes a suitable grade for gravity systems. Sprinkler systems are commonly used where adjacent soils are too sloping for gravity irrigation. Efficiently using water and controlling runoff are important.

This soil is suited to pasture and hay. Production can be improved or maintained by stocking at proper rates and rotating grazing. Introduced grasses respond to fertilizer and irrigation. Grazing should be delayed in spring and after irrigation until the soil surface is firm and grass has reached minimum height. Production can be increased by growing a mixture of grasses and legumes.

This soil is suited to range. Range vegetation reduces water and wind erosion. Overgrazing or using improper haying methods reduces the protective cover and decreases the forage value of the vegetation. Proper grazing, deferred grazing or haying, and use of a planned grazing system maintain or improve range condition.

This soil is suited to trees and shrubs for windbreaks. Seedlings generally survive and grow if competing vegetation is controlled or removed by good site preparation and by timely cultivation between tree rows or use of approved herbicides. Maintaining strips of sod or a cover crop between rows helps to prevent wind erosion. Irrigation can supplement moisture in dry periods while windbreaks are being established.

This soil is suited to septic tank absorption fields. Sewage lagoons should be sealed or lined to prevent seepage, and the surface should be graded to modify the slope. This soil provides good sites for dwellings and small commercial buildings. Damage to roads and streets by frost action can be reduced by providing good surface drainage. Crowning the road by grading and constructing adequate side ditches provides the needed surface drainage. The surface pavement and subbase of roads and streets must be thick enough to compensate for the low strength of the soil. Using coarser grained material for subgrade or base material improves performance.

This soil is in capability units IIe-1 dryland and IIe-6 irrigated, Silty range site, and windbreak suitability group 3.

Or—Ord very fine sandy loam, 0 to 1 percent slopes. This deep, nearly level, somewhat poorly drained soil is on bottom lands along major streams and rivers. It formed in sandy and loamy alluvium. It is occasionally flooded. Individual areas range from 10 to 100 acres in size.

Typically, the surface layer is grayish brown, very friable very fine sandy loam about 10 inches thick. The next 12 inches is light brownish gray fine sandy loam. The underlying material is light brownish gray fine sandy loam in the upper part and light gray, mottled fine sand in the lower part to a depth of 60 inches. In many places the surface layer is fine sandy loam.

Included with this soil in mapping are small areas of Barney, Boel, Gannett, and Loup soils. Boel soils are sandy higher in the profile. Barney, Gannett, and Loup soils are wetter and are in slightly lower positions. Inclusions make up 5 to 15 percent of the map unit.

Permeability is moderately rapid, and available water capacity is moderate. Runoff is slow. The seasonal high water table is between depths of 1.5 feet in wet years and 3.5 feet in dry years. Organic matter content is moderately low, and natural fertility is medium. Water intake rate is moderately high.

Most areas of this soil are rangeland used for grazing or hay. Some areas are farmed.

If dryfarmed, this soil is suited to corn, grain sorghum, wheat, and alfalfa. The main hazards are wind erosion and wetness. Stripcropping, field windbreaks, and leaving crop residue on the surface help to reduce wind erosion and conserve moisture. Where suitable outlets are available, tile or open ditch drains lower the seasonal high water table. Returning crop residue or green manure crops to the soil maintains or improves organic matter content and fertility.

If irrigated, this soil is suited to corn or alfalfa. Wind erosion and wetness are the main hazards. Wind erosion can be controlled by field windbreaks and by leaving crop residue on the surface. Tile drains or open ditches lower the water table if outlets are available. Gravity

irrigation systems require relatively short runs because of the soil's moderately high intake rate and moderate available water capacity. Sprinkler irrigation systems distribute water uniformly at controlled rates.

This soil is suited to pasture and hay. Wetness and flooding are problems. Grazing or haying should be delayed until the soil surface is firm and grass has reached minimum height. Silt or sand deposited by floods may damage grasses. Production can be improved or maintained by stocking at proper rates and rotating grazing. Introduced grasses respond to fertilizer and irrigation. Production can be increased by growing a mixture of grasses and legumes.

This soil is suited to range for either grazing or haying. Range vegetation controls wind erosion. Overgrazing or improper haying methods reduce the protective cover and decrease the forage value of the vegetation. Proper grazing and deferred grazing or haying maintain the plant community in good condition.

This soil is good for planting trees and shrubs for windbreaks. Species that tolerate occasional wetness survive and grow well. Wind erosion is a hazard to new seedlings. Planting a cover crop between the rows of trees helps to control wind erosion.

This soil is unsuitable for septic tank absorption fields, sewage lagoons, and buildings because of flooding, wetness, poor filtering, and seepage. Other sites should be found. Damage to roads by frost action can be reduced by providing good surface drainage and by using a gravel moisture barrier in the subgrade. Crowning the road by grading and constructing adequate side ditches help to provide the needed surface drainage. Constructing roads on suitable, well compacted fill above the flood level and providing adequate side ditches and culverts help to protect roads from flood damage and wetness.

This soil is in capability units IIw-4 dryland and IIw-8 irrigated, Subirrigated range site, and windbreak suitability group 2S.

Ov—Ovina loam, 0 to 2 percent slopes. This deep, nearly level, somewhat poorly drained soil is on stream terraces. It formed in sandy and loamy alluvium. It is rarely flooded. Individual areas range from 10 to 150 acres in size.

Typically, the surface layer is gray, friable, calcareous loam about 19 inches thick. The underlying material is light gray, mottled fine sandy loam to a depth of 60 inches. It is calcareous in the upper part. In some places the underlying material has thin strata of fine sand.

Included with this soil in mapping in slightly lower positions are small areas of Gannett soils. Gannett soils are very poorly drained. Inclusions make up 10 to 20 percent of the map unit.

Permeability is moderately rapid, and available water capacity is high. Runoff is slow. The seasonal water table is between depths of 1.5 feet in wet years and 3.0 feet in dry years. Organic matter content is moderately low, and natural fertility is medium. Water intake rate is moderately high.

Most of the acreage of this soil is farmed. A few areas are rangeland used for grazing or hay.

If dryfarmed, this soil is suited to corn, grain sorghum, wheat, and alfalfa. The principal hazard is wetness. Wind erosion is also a hazard if the soil is not protected by crop residue or vegetation. Conservation tillage practices, such as minimum tillage, help to prevent wind erosion. Where suitable outlets are available, tile or open ditch drains lower the water table.

If irrigated, this soil is suited to corn and alfalfa. Wetness is the main limitation. There is a hazard of wind erosion if the soil is not protected by crop residue or growing plants. Conservation tillage (such as till-plant, no-till, disk-and-plant) helps to prevent wind erosion. Tile or open ditches will lower the water table if suitable outlets are available. Gravity irrigation systems require relatively short runs because of the soil's moderately high water intake rate. Sprinkler irrigation systems distribute water uniformly at controlled rates.

This soil is suited to pasture and hay. Wetness and flooding are problems. Grazing or haying should be delayed until the soil surface is firm and grass has reached minimum height. Silt or sand deposited by floods may damage grasses. Production can be improved or maintained by stocking at proper rates and rotating grazing. Introduced grasses respond to fertilizer and irrigation. Production can be increased by growing a mixture of grasses and legumes.

This soil is suited to range for either grazing or hay. Overgrazing or improper haying methods reduce the protective cover and decrease the forage value of the vegetation. Proper grazing and deferred grazing or haying maintain the plant community in good condition.

This soil is good for planting trees and shrubs for windbreaks. Species that tolerate occasional wetness survive and grow well.

Septic tank absorption fields and sewage lagoons can be constructed in fill above the seasonal high water table. Ground water pollution by septic fields is a concern. Sewage lagoons may seep unless lined or sealed. This soil is generally not suited to shallow excavations and dwellings with basements because of the seasonal high water table. Constructing dwellings without basements and small commercial buildings on raised, well compacted fill avoids the wetness and flooding. Damage to roads and streets by frost action can be reduced by providing good surface drainage and by using a gravel moisture barrier in the subgrade. Crowning the road by grading and constructing adequate side ditches help to provide the needed surface drainage.

This soil is in capability units IIw-4 dryland and IIw-8 irrigated, Subirrigated range site, and windbreak suitability group 2S.

Pg—Pits, gravel. These areas consist of water-filled pits and the surrounding spoil areas. Sand and gravel have been mined in these areas for construction material. These areas are on bottom lands along major rivers and streams where the water table is 1 to 4 feet below the surface. The sand and gravel is pumped with the water, sorted, and stalk piled. The water and finer material are returned to the pit. These areas are occasionally flooded. Individual areas range from 10 to 40 acres in size.

Typically, material in these areas consist of a mixture of fine, medium, and coarse sand and varying amounts of gravel. The original soil profiles have been destroyed in mining.

Properties can be determined by on-site investigation. Much of the spoil areas is devoid of vegetation, although idle areas may have sparse weeds, grasses, or trees and shrubs.

Most areas of this unit are used for commercial mining of sand and gravel. A few areas have been abandoned or are only occasionally mined.

This unit is unsuitable for cultivated crops, range, or trees and shrubs for windbreaks. Some areas provide wildlife habitat or have potential for recreation.

This unit is unsuitable for septic tank absorption fields, sewage lagoons, dwellings, or roads and streets because of flooding and the irregular areas of water and piles of sand. Other sites should be found.

Pits are in capability unit VIIIs-8 dryland and windbreak suitability group 10.

Ru—Rusco silty clay loam, 0 to 1 percent slopes. This deep, nearly level, moderately well drained soil is in swales or shallow depressions on stream terraces and in valleys. It formed in recent loess or alluvium. It is ponded for short periods. Individual areas range from 5 to 50 acres in size.

Typically, the surface layer is dark gray, firm silty clay loam about 10 inches thick. The subsoil is about 16 inches thick. It is grayish brown, firm silty clay loam in the upper part and pale brown, friable silt loam in the lower part. The underlying material is 14 inches of pale brown, mottled silt loam over light brownish gray very fine sandy loam to a depth of 60 inches. In some areas the underlying material below a depth of 40 inches is fine sand.

Included with this soil in mapping are small areas of Cozad, Hord, and Kenesaw soils. Each of these soils has less clay in the subsoil, is better drained, and is above the Rusco soil. Inclusions make up 5 to 15 percent of the map unit.

Permeability is moderately slow, and available water capacity is high. Runoff is very slow. Tilth is fair. Organic matter content is moderate, and natural fertility is high. Water intake rate is low.

Most of the acreage of this soil is farmed, both dryland and irrigated. Irrigated areas have generally been artificially drained by land leveling.

If dryfarmed, this soil is suited to corn, grain sorghum, and wheat. Ponding is the main hazard. Tillage is commonly delayed because of wetness. Terraces or diversions on adjacent sloping soils reduce ponding on this soil. Returning crop residue to the soil and applying barnyard manure make the plow layer more friable and maintain fertility.

Under sprinkler and gravity irrigation systems, this soil is poorly suited to corn, grain sorghum, and alfalfa. Ponding is the main problem but can be eliminated by providing good surface drainage and using terraces and diversions on adjacent sloping soils to reduce runoff. Returning crop residue and applying barnyard manure to the soil make the plow layer more friable and help to maintain fertility. Controlling runoff of irrigation water and using water efficiently are concerns.

This soil is suited to pasture and hay. Ponding is a major problem in some areas. Surface drainage may be required to maintain satisfactory stands of grasses. Grazing or haying should be delayed until the soil surface is firm and grass has reached minimum height. Deposition of silt may damage grasses. Production can be improved or maintained by stocking at proper rates and rotating grazing. Introduced grasses respond to fertilizer and irrigation. Production can be increased by growing a mixture of grasses and legumes.

This soil is suited to range. Overgrazing or grazing when the soil is wet decreases the forage value of the vegetation and causes surface compaction.

This soil is good for planting trees and shrubs for windbreaks. Weeds and grasses that compete with trees and shrubs for moisture can be controlled by cultivation or by use of approved herbicides.

This soil is unsuitable for septic tank absorption fields, sewage lagoons, and dwellings because of ponding. Other sites should be found. Constructing roads on suitable, well compacted fill material above the level of ponding and providing adequate side ditches and culverts help to protect roads from damage caused by ponded water. Damage to roads by frost action can be reduced by providing good surface drainage and by using a gravel moisture barrier in the subgrade. Crowning the road by grading and constructing adequate side ditches help to provide the needed surface drainage.

This soil is in capability units IIw-3 dryland and IIw-3 irrigated, Silty Overflow range site, and windbreak suitability group 1.

Sc—Scott silty clay loam, 0 to 1 percent slopes. This deep, nearly level, very poorly drained soil is in depressions on uplands. It formed in loess. It is ponded for several days in most years (fig. 8). Individual areas range from 5 to 100 acres in size.

Typically, the surface layer is dark gray, firm silty clay loam about 3 inches thick. The subsurface layer is light gray, friable silt loam about 2 inches thick. The subsoil is about 44 inches thick. It is dark gray, very firm silty clay in the upper part; gray, very firm silty clay in the middle part; and grayish brown, friable silty clay loam in the lower part. The underlying material is light brownish gray, calcareous silt loam to a depth of 60 inches. In some places the surface layer is silt loam.

Included with this soil in mapping in similar depressions are small areas of Fillmore Variant soils. Fillmore Variant soils are thick, recent, stratified alluvium over a buried soil. Inclusions make up 5 to 20 percent of the map unit.

Permeability is very slow, and available water capacity is high. Runoff is very slow. The perched seasonal high water table ranges from 0.5 foot above the surface to 1 foot below the surface. Tilth is poor. The soil is difficult to cultivate because it is generally either too wet or, when dry, too hard. When the soil is dry, the surface layer is hard and the subsoil is very hard. Organic matter content is moderate, and natural fertility is medium. Shrink-swell potential of the subsoil is high.

Most of the acreage of this soil is used for pasture with adjacent soils or is left idle. The vegetation usually consists of smartweed and other aquatic plants. A few areas are farmed.

Because of ponding, this soil is generally not suitable for irrigated crops, range, or trees and shrubs in windbreaks.

If dryfarmed, this soil is poorly suited to grain sorghum, corn, and wheat. Seedbed preparation is often delayed or cannot be performed because of wetness. Because of the very slow permeability, most of the water is lost by evaporation rather than through the soil. Wheat is often lost because of ponding in early spring or lodging resulting from wet conditions at harvest. Corn and grain sorghum are also damaged by excessive wetness, and seedling emergence is difficult because of surface crusting and the poor seedbed this soil provides. Competition from weeds is a problem because excessive wetness and poor tilth make timely cultivation difficult. Ponded water causes severe crop losses in 7 years out of 10 except where the soil is artificially drained. During years in which crops cannot be grown because of ponding, annual weeds and grasses are the principal vegetation. Ponding can be reduced by terraces, contour farming, and crop residue management on the adjacent sloping soils. Outlets for surface drainage are generally not available.

Figure 8.—Area of Scott silty clay loam, 0 to 1 percent slopes, ponded after heavy rain. The surrounding soil is Holdrege silt loam, 3 to 6 percent slopes, eroded.

This soil is poorly suited to pasture and hay. Ponding is the main problem. Surface drainage is required to maintain satisfactory stands of grasses. Grazing or haying should be delayed until the soil surface is firm and grass has reached minimum height. Production can be improved or maintained by stocking at proper rates, rotating grazing, and controlled grazing.

This soil is unsuitable for septic tank absorption fields, sewage lagoons, and dwellings because of ponding. Constructing roads on suitable, well compacted fill material above the level of ponding and providing adequate side ditches and culverts help to protect the roads from damage. Damage to roads from frost action can be reduced by providing good surface drainage and by using a gravel moisture barrier in the subgrade. Crowning the road by grading and constructing adequate side ditches help to provide the needed surface drainage. Surface material and base material of roads and streets must be thick enough to compensate for the low strength of the soil. Using coarser grained base material improves performance of paved roads. ponding.

This soil is in capability unit IVw-2 dryland and windbreak suitability group 10.

UbD—Uly silt loam, 6 to 11 percent slopes. This deep, strongly sloping, well drained soil is on sides and tops of ridges on uplands. It formed in loess. Individual areas range from 10 to 150 acres in size.

Typically, the surface layer is very dark grayish brown, friable silt loam about 7 inches thick. The subsoil is about 13 inches thick. It is dark grayish brown, friable silt loam in the upper part and grayish brown, friable silt loam in the lower part. The underlying material is light gray, calcareous silt loam to a depth of 60 inches. In a few areas the surface layer has been eroded.

Included with this soil in mapping are areas of Coly and Holdrege soils. Coly soils are commonly on ridgetops and Holdrege soils are on the lower part of side slopes. Coly soils are calcareous at or near the surface. Holdrege soils have more clay in the subsoil. Inclusions make up 15 to 30 percent of the map unit.

Permeability is moderate, and available water capacity is high. Runoff is very rapid. Organic matter content is moderate, and natural fertility is medium. Water intake rate is moderate.

Most of the acreage of this soil is rangeland used for grazing or hay. A few areas are cultivated.

If dryfarmed, this soil is poorly suited to grain sorghum, wheat, and alfalfa. The water erosion hazard is severe when the soil surface is not adequately protected by vegetation or crop residue. Terraces, contour farming, and conservation tillage that leaves crop residue on the surface help to control erosion and conserve moisture. Returning crop residue and green manure crops to the soil maintains or improves organic matter content and fertility.

If irrigated, this soil is poorly suited to corn, grain sorghum, and alfalfa. Terraces, contour farming, and conservation tillage that leaves crop residue on the surface help to control erosion and conserve moisture. This soil is not suited to gravity irrigation systems, but sprinkler systems can be used with careful management. Center-pivot sprinkler systems are the most common. Erosion in the wheel tracks can be a problem. Adjusting the rate of water application to the soil's moderate water intake rate helps to prevent runoff and water erosion. Limiting the use of row crops and growing close-grown crops such as alfalfa and grass also help to prevent runoff and water erosion.

This soil is suited to pasture and hay. Overgrazing increases water erosion. Production can be improved and erosion reduced by stocking at proper rates and rotating grazing. Introduced grasses respond to fertilizer and sprinkler irrigation. Irrigation water applications should not exceed the soil's water intake rate. Grazing should be delayed in spring and after irrigation until the soil surface is firm and grass has reached minimum height. Production can be increased by growing a mixture of grasses and legumes.

Range vegetation controls water erosion. Overgrazing or improper haying methods reduce the protective cover and can allow water erosion, as well as decreasing the forage value of the vegetation. Proper grazing, deferred grazing or haying, and use of a planned grazing system maintain or improve range condition.

This soil is suited to trees and shrubs for windbreaks. Water erosion is the main hazard to establishing seedlings. Planting trees and shrubs on the contour or terracing controls water erosion. Maintaining strips of sod or a cover crop between rows also helps to prevent erosion. Seedlings generally survive and grow well if competing vegetation is controlled or removed by good site preparation and timely cultivation or use of approved herbicides. Supplemental moisture may be needed in dry periods while windbreaks are being established.

For proper operation of septic tank absorption fields, the surface of the soil has to be reshaped and the lines have to be laid on the contour. Sewage lagoons also need extensive grading to modify the slope. Dwellings and small commercial buildings can be designed to accommodate the slope, or the soil can be graded to an acceptable slope. The surface material and base material of roads must be thick enough to compensate for the low strength of the soil. Using coarser grained base material improves performance of paved roads.

This soil is in capability units IVe-1 dryland and IVe-6 irrigated, Silty range site, and windbreak suitability group 3.

UbE—Uly silt loam, 11 to 15 percent slopes. This deep, moderately steep, well drained soil is on tops and sides of ridges on uplands. It formed in loess. Individual areas range from 10 to 500 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 10 inches thick. The subsoil is friable silt loam about 15 inches thick. It is grayish brown

in the upper part, light brownish gray in the middle part, and light gray in the lower part. The underlying material is white silt loam to a depth of 60 inches. In some places the surface layer has been eroded.

Included with this soil in mapping are small areas of Coly and Holdrege soils. Coly soils are commonly on the ridgetops, and Holdrege soils are on the lower parts of side slopes. Coly soils are calcareous at or near the surface. Holdrege soils have more clay in the subsoil. Inclusions make up 5 to 15 percent of the map unit.

Permeability is moderate, and available water capacity is high. Runoff is very rapid. Organic matter content is moderate, and natural fertility is medium.

Nearly all of the acreage of this soil is rangeland used for grazing.

This soil is generally unsuitable for dryfarmed or irrigated crops because of the steepness and the water erosion hazard.

Range vegetation controls water erosion. Overgrazing or improper haying methods reduce the protective cover and decreases the forage value of the vegetation. Overgrazing also can result in severe water erosion. Proper grazing, deferred grazing or haying, and use of a planned grazing system maintain or improve range condition.

This soil is suited to trees and shrubs for windbreaks. Water erosion is the main hazard to establishing seedlings. Planting trees and shrubs on the contour or terracing controls water erosion. Maintaining strips of sod or a cover crop between rows also helps to control erosion. Seedlings generally survive and grow well if competing vegetation is controlled or removed by good site preparation and timely cultivation or use of approved herbicides.

For septic tank absorption fields to operate properly, the surface of the soil has to be reshaped and the lines have to be laid on the contour. Dwellings and small commercial buildings can be designed to fit the slope, or the soil can be graded to an acceptable slope. The surface material and base material of roads must be thick enough to compensate for the low strength of the soil. Using coarser-grained material improves performance of paved roads.

This soil is in capability unit VIe-1 dryland, Silty range site, and windbreak suitability group 3.

UcF—Uly-Coly silt loam, 15 to 30 percent slopes. These deep, steep, somewhat excessively drained soils are on narrow tops and sides of ridges on dissected uplands (fig. 9). They formed in loess. The Uly soil makes up 45 to 65 percent of the map unit, and the Coly soil makes up 25 to 35 percent. Areas of these soils are so intricately mixed that separating them in mapping is not practical. Areas of this complex range from 10 acres to several hundred acres in size.

Figure 9.—Area of Uly-Coly silt loams, 15 to 30 percent slopes.

Typically, the surface layer of the Uly soil is dark grayish brown, friable silt loam about 7 inches thick. The subsoil is friable silt loam about 10 inches thick. It is brown in the upper part and pale brown in the lower part. The underlying material is very pale brown, calcareous silt loam to a depth of 60 inches.

Typically, the surface layer of the Coly soil is grayish brown, very friable silt loam about 4 inches thick. The next 3 inches is brown, calcareous silt loam. The underlying material is very pale brown, calcareous silt loam to a depth of 60 inches. Some areas are calcareous at the surface.

Included with these soils in mapping are small areas of Hobbs and Holdrege soils. Hobbs soils are stratified, are occasionally flooded, and are on narrow bottom lands below the Uly and Coly soils. Holdrege soils have more clay in the subsoil and are generally above the Uly and Coly soils on narrow ridgetops. Inclusions make up 10 percent of this map unit.

Permeability is moderate and available water capacity is high in both soils. Runoff is very rapid. Organic matter content is moderate in the Uly soil and moderately low in the Coly soil. Natural fertility is medium in the Uly soil and low in the Coly soil.

Most of the acreage of these soils is rangeland.

These soils are not suitable for dryfarmed or irrigated crops or trees and shrubs for windbreaks because of steep slope and severe water erosion hazard.

Range vegetation controls water erosion. Overgrazing reduces the protective cover and can allow severe water erosion and creation of gullies. Overgrazing also decreases the forage value of the vegetation. Proper grazing, deferred grazing, and use of a planned grazing system maintain or improve range condition. Providing adequate water and salt facilities helps to distribute livestock uniformly and prevents overgrazing near such facilities.

These soils are generally unsuitable for buildings and sanitary facilities because of the steep slope. Suitable sites usually can be found on the adjacent less sloping soils. Slope can be modified by cutting and filling for local roads and streets, or another route could be found. The surface material and base material of roads and streets must be thick enough to compensate for the low strength of the soil. Using coarser grained base material improves performance of paved roads.

These soils are in capability unit VIe-1 dryland and windbreak suitability group 10. The Uly soil is in Silty range site, and the Coly soil is in Limy Upland range site.

VaB—Valentine fine sand, 0 to 3 percent slopes. This deep, nearly level, and very gently sloping, excessively drained soil is on uplands. It formed in eolian sand. Individual areas range from 30 to 500 acres in size.

Typically, the surface layer is grayish brown, loose fine sand about 8 inches thick. The next 5 inches is brown fine sand. The underlying material is pale brown in the upper part and very pale brown in the lower part to a depth of 60 inches. It is fine sand. In some places the surface layer is loamy fine sand.

Included with this soil in mapping are small areas of Hersh and Ipage soils. Hersh soils are in similar positions, and Ipage soils are slightly lower. Hersh soils are fine sandy loam throughout. Ipage soils are moderately well drained with a seasonal high water table between depths of 3 and 6 feet. Inclusions make up 10 percent of this map unit.

Permeability is rapid, and available water capacity is low. Runoff is very slow. Organic matter content and natural fertility are low. Water intake rate is very high.

Most of the acreage of this soil is rangeland used for grazing or hay. A few areas are farmed under center-pivot sprinkler irrigation.

This soil is not suitable for dryfarmed corn, grain sorghum, wheat, or alfalfa and grasses for hay because of the severe wind erosion hazard and the low moisture supply.

If irrigated, this soil is poorly suited to corn, grain sorghum, and alfalfa. Wind erosion can be reduced by field windbreaks and conservation tillage. This soil is not suited to gravity irrigation systems because of its very high water intake rate. Center-pivot sprinkler systems are the most common because they distribute water uniformly at controlled rates. Nutrients are easily leached below the root zone in this sandy soil. Fertilizer can be applied in small quantities through the sprinkler system throughout the growing season to minimize loss. The low available water capacity requires that water be applied in relatively small amounts at regular intervals.

Under sprinkler irrigation, this soil is suited to pasture and hay. The hazard of wind erosion is severe if adequate cover is not maintained. Production can be improved and the soil protected by stocking at proper rates and rotating grazing. Grasses respond to fertilizer, which can be effectively applied through the sprinkler irrigation system. Production can be increased by growing a mixture of grasses and legumes.

Range vegetation controls wind erosion. Overgrazing or improper haying methods reduce the protective cover and can allow severe wind erosion and creation of small blowouts, as well as decreasing the forage value of the vegetation. Proper grazing, deferred grazing or haying, and use of a planned grazing system maintain or improve range condition.

This soil is suited to trees and shrubs for windbreaks. Wind erosion and droughtiness are the major hazards to establishing a windbreak. Wind erosion and covering of seedlings by drifting sand can be prevented by planting in shallow furrows with as little disturbance of the soil as possible. Supplemental irrigation can provide moisture during periods of insufficient rainfall.

This soil readily absorbs the effluent from septic tank absorption fields, but it does not adequately filter the

effluent. As a result, ground water can become polluted. Other sites should be found for sewage lagoons because of seepage. This soil is suited to dwellings and small commercial buildings, but excavations may slough or cave in unless shored. This soil is suited to local roads and streets. Wind erosion is a hazard because the sandy soil material will not compact to form a stable road surface. Clayey or loamy soil màterial can be hauled in and incorporated with the sandy material to form a more stable road surface.

This soil is in capability units VIe-5 dryland and IVe-12 irrigated, Sandy range site, and windbreak suitability group 7.

VaD—Valentine fine sand, 3 to 9 percent slopes. This deep, undulating to rolling, excessively drained soil is on uplands in the sandhills. It formed in eolian sand. Individual areas range from 20 to 150 acres in size.

Typically, the surface layer is grayish brown, loose fine sand about 6 inches thick. The next 6 inches is pale brown fine sand. The underlying material is pale brown fine sand to a depth of 60 inches. In some places the surface layer is loamy fine sand.

Included with this soil in mapping in the lower areas are small areas of finer textured Hersh soils. Hersh soils are fine sandy loam throughout. Inclusions make up 5 to 15 percent of the map unit.

Permeability is rapid, and available water capacity is low. Runoff is slow. Organic matter content and natural fertility are low. Water intake rate is very high.

Most of the acreage of this soil is rangeland used for grazing or hay. A few areas are farmed under sprinkler irrigation.

This soil is unsuitable for dryfarmed crops because of the very severe hazard of wind erosion and the lack of moisture caused by the low available water capacity.

If sprinkler irrigated, this soil is poorly suited to corn, grain sorghum, and alfalfa and grasses. Wind erosion and droughtiness are severe hazards. Field windbreaks and crop residue left on the surface help to prevent wind erosion and conserve moisture. Returning crop residue to the soil maintains or improves organic matter content and fertility. This soil is not suited to gravity irrigation systems because of its very high water intake rate. Center-pivot sprinkler systems are the most common because they distribute water uniformly at controlled rates. Nutrients are easily leached below the root zone in this coarse textured soil. Fertilizer can be applied in small quantities through the sprinkler system throughout the growing season to minimize loss. The low available water capacity requires that water be applied in relatively small amounts at regular intervals.

Under sprinkler irrigation, this soil is poorly suited to pasture and hay. The hazard of wind erosion is severe if adequate cover is not maintained. Production can be improved or maintained and the soil protected by stocking at proper rates and rotating grazing. Grasses respond to fertilizer, which can be effectively applied through the sprinkler irrigation system. Production can be increased by growing a mixture of grasses and legumes.

Range vegetation controls wind erosion. Overgrazing or improper haying methods reduce the protective cover and can allow severe wind erosion and creation of blowouts, as well as decreasing the forage value of the vegetation. Proper grazing, deferred grazing or haying, and use of a planned grazing system maintain or improve range condition.

This soil is poorly suited to trees and shrubs for windbreaks. Wind erosion and droughtiness are severe hazards. Wind erosion can be reduced by planting in shallow furrows with as little disturbance of the soil as possible. Supplemental irrigation may be needed while windbreaks are being established.

This soil readily absorbs the effluent from septic tank absorption fields, but it does not adequately filter the effluent. As a result, ground water may become polluted. This soil is unsuitable for sewage lagoons because of seepage; other sites should be found. This soil is suited to dwellings, but excavations may slough or cave in unless shored. Small commercial buildings can be designed to fit the slope, or the soil can be graded to an acceptable slope. This soil is suited to local roads and streets. Wind erosion is a hazard because the sandy soil material will not compact to form a stable road surface. Clayey or loamy material can be hauled in and incorporated with the sandy material to form a more stable road surface.

This soil is in capability units VIe-5 dryland and IVe-12 irrigated, Sandy range site, and windbreak suitability group 7.

VaE—Valentine fine sand, rolling. This deep, excessively drained soil is on uplands. Slope ranges from 9 to 17 percent. This soil formed in eolian sand. Individual areas range from 40 acres to several thousand acres in size.

Typically, the surface layer is grayish brown, loose fine sand about 6 inches thick. The next 6 inches is light brownish gray fine sand. The underlying material is light gray fine sand to a depth of 60 inches. Some areas are less sloping or more steep.

Included with this soil in mapping are small areas of Els and Hersh soils. Els soils are somewhat poorly drained and are in nearly level swales below Valentine soils. Hersh soils are fine sandy loam throughout and are in similar positions. Also included are less sloping areas in some swales of Valentine soils. Inclusions make up 5 to 10 percent of the map unit.

Permeability is rapid, and available water capacity is low. Runoff is slow. Organic matter content and natural fertility are low.

Nearly all of the acreage of this soil is rangeland used for grazing.

This soil is not suitable for dryfarmed or irrigated crops, pasture, or hay because of slope, wind erosion, and droughtiness.

Range vegetation controls wind erosion, but overgrazing reduces the protective cover and can allow severe wind erosion and creation of blowouts. Overgrazing also decreases the forage value of the vegetation. Proper grazing, deferred grazing, and use of a planned grazing system maintain or improve range condition. Carefully locating an adequate number of water and salt facilities helps to distribute livestock for more uniform grazing and prevent overgrazing adjacent to these facilities. It also helps to eliminate long livestock paths, which can develop into blowouts.

This soil is poorly suited to trees and shrubs for windbreaks. Wind erosion and droughtiness are severe hazards to seedlings. Wind erosion can be reduced by planting trees and shrubs in shallow furrows with as little disturbance of the soil as possible. Supplemental irrigation may be needed while windbreaks are being established.

This soil readily absorbs the effluent from septic tank absorption fields, but it does not adequately filter the effluent. As a result, ground water may become polluted. This soil is generally unsuitable for sewage lagoons because of seepage and slope. Dwellings and small commercial buildings can be designed to fit the slope, or the soil can be graded to an acceptable slope. Excavations may slough or cave in unless shored. The very severe hazard of wind erosion, low silt and clay content of the soil material, and unstable nature of the soil make road construction very difficult. Cutting and filling is generally needed to form a suitable slope for roads.

This soil is in capability unit VIe-5 dryland, Sands range site, and windbreak suitability group 7.

VaF—Valentine fine sand, rolling and hilly. This deep, excessively drained soil is in areas where rolling and hilly landscapes are closely intermingled. Slope ranges from 9 to 60 percent. The hilly parts are steeper than the rolling parts and commonly are higher. Each part makes up 30 to 70 percent of the map unit. The parts are so intricately mixed or so small in area that separating them in mapping is not practical. Individual areas of this map unit range from 20 acres to several hundred acres in size.

Typically, the surface layer is grayish brown, loose fine sand about 6 inches thick. The next 8 inches is pale brown fine sand. The underlying material is very pale brown fine sand to a depth of 60 inches. In some places the surface layer is thinner or is absent because of wind erosion. Some places are less sloping or steeper.

Included with this soil in mapping are small areas of Hersh soils. Hersh soils are fine sandy loam throughout. Inclusions make up 2 to 5 percent of the map unit.

Permeability is rapid, and available water capacity is very low. Runoff is slow. Organic matter content and natural fertility are low.

All of the acreage of this soil is rangeland used for grazing.

This soil is not suitable for dryfarmed or irrigated crops, pasture, or hay because of the very steep, irregular slopes.

This soil is suited to range. The hazard of wind erosion is severe. Vegetation is generally more sparse on the hilly parts of the map unit than on the rolling parts because the very steep slopes are more susceptible to damage by livestock and erosion. Overgrazing reduces the protective cover and can allow severe wind erosion and creation of blowouts. Overgrazing also reduces the forage value of the vegetation. Proper grazing, deferred grazing, and use of a planned grazing system maintain or improve range condition. Carefully locating an adequate number of water and salt facilities distributes livestock for more uniform grazing, prevents overgrazing adjacent to these facilities, and eliminates long paths which can develop into blowouts.

This soil is generally unsuitable for trees and shrubs for windbreaks. In some areas drought-tolerant trees can be hand planted for recreation and wildlife uses. On-site investigation may find small areas suitable for planting.

This soil readily absorbs effluent from septic tank absorption fields, but it does not adequately filter the effluent. As a result, ground water may become polluted. The soil is not suitable for sewage lagoons, shallow excavations, dwellings, and small commercial buildings because of the very steep slopes; other sites should be found. Other sites should be found for local roads because the extensive cuts and fills needed on this soil would leave the soil exposed to very severe wind erosion.

This soil is in capability unit VIIe-5 dryland and windbreak suitability group 10. This soil is in Sands range site where rolling and in Choppy Sands range site where hilly.

VbB—Valentine loamy fine sand, 0 to 3 percent slopes. This deep, nearly level and very gently sloping, excessively drained soil is on uplands and stream terraces. It formed in eolian sand. Individual areas range from 10 to 150 acres in size.

Typically, the surface layer is grayish brown, loose loamy fine sand about 8 inches thick. The next 8 inches is pale brown, loose loamy fine sand. The underlying material is very pale brown loamy fine sand to a depth of 60 inches. In some areas the surface layer is fine sand.

Included with this soil in mapping are small areas of Anselmo and Hersh soils. Anselmo and Hersh soils are fine sandy loam throughout. Anselmo soils have a thicker surface layer. Inclusions make up 10 to 20 percent of the map unit.

Permeability is rapid, and available water capacity is low. Runoff is very slow. Organic matter content and natural fertility are low. Water intake rate is very high.

Some areas of this soil are farmed. Some areas are rangeland used for grazing or hay.

If dryfarmed, this soil is poorly suited to grain sorghum and wheat. Wind erosion and lack of moisture are the main hazards. Stripcropping, field windbreaks, and leaving crop residue on the surface help to control wind erosion and conserve moisture. Limiting the use of row crops and growing close-grown crops help to protect the soil from wind. Returning crop residue to the soil maintains or improves organic matter content and fertility.

If sprinkler irrigated, this soil is poorly suited to corn, grain sorghum, and alfalfa and grass for hay or pasture. This soil is not suited to gravity irrigation because of the very high water intake rate and low available water capacity. Wind erosion can be reduced by field windbreaks and by leaving crop residue on the surface. Careful application rates and timely application of water are important. Leaching of some important plant nutrients may be a problem. Returning crop residue to the soil improves or maintains organic matter content and fertility.

This soil is poorly suited to pasture and hay. Production can be improved or maintained and the soil protected from wind by stocking at proper rates and rotating grazing. Irrigation, fertilization, and growing a mixture of grasses and legumes increase production.

Range vegetation controls wind erosion, but overgrazing or improper haying methods reduce the protective cover and can allow severe wind erosion, as well as decreasing the forage value of the vegetation. Proper grazing, deferred grazing or haying, and use of a planned grazing system maintain or improve range condition.

This soil is fair for planting trees and shrubs for windbreaks. Lack of moisture, wind erosion, and competition from weeds and grasses are the main limitations. Supplemental irrigation may be needed while windbreaks are being established. Wind erosion can be reduced by maintaining sod or a cover crop between rows. Weeds and grasses can be controlled by cultivation or use of approved herbicides.

This soil readily absorbs the effluent from septic tank absorption fields, but it does not adequately filter the effluent. As a result, ground water may become polluted. Other sites should be found for sewage lagoons because of seepage. This soil is suited to dwellings and small commercial buildings, but excavations may slough or cave in unless shored. This soil is suited to local roads and streets, but wind erosion is a hazard because the sandy soil material will not compact to form a stable road surface. Clayey or loamy soil material can be hauled in and incorporated with the sandy material to form a more stable road surface.

This soil is in capability units IVe-5 dryland and IVe-11 irrigated, Sandy range site, and windbreak suitability group 7.

VbD—Valentine loamy fine sand, 3 to 9 percent slopes. This deep, undulating, excessively drained soil is on uplands and stream terraces. It formed in eolian sand. Individual areas range from 10 to 200 acres in size.

Typically, the surface layer is grayish brown, loose loamy fine sand about 5 inches thick. The underlying material is very pale brown loamy fine sand to a depth of 60 inches. In some places the surface layer is fine sand.

Included with this soil in mapping are small areas of less sloping Gates and Hersh soils. Gates and Hersh soils have more clay throughout. Inclusions make up 10 to 20 percent of the map unit.

Permeability is rapid, and available water capacity is low. Runoff is slow. Organic matter content and natural fertility are low. Water intake rate is very high.

Most of the acreage of this soil is rangeland used for grazing or hay. A few areas are farmed.

This soil is generally not suitable for dryfarmed crops because of lack of moisture and the wind erosion hazard.

If sprinkler irrigated, this soil is poorly suited to corn, grain sorghum, and alfalfa. It is not suited to gravity irrigation because of its very high water intake rate. Field windbreaks and crop residue left on the surface help to prevent wind erosion. Efficient water use and controlled application rates are very important. Small amounts of plant nutrients may be applied through the sprinkler system, instead of larger applications that may be partially lost through leaching. Returning crop residue to the soil maintains or improves organic matter content and fertility.

Under sprinkler irrigation, this soil is poorly suited to pasture and hay. The hazard of wind erosion is severe if adequate cover is not maintained. Production can be improved or maintained and the soil protected by stocking at proper rates and rotating grazing. Grasses respond to fertilizer, which can be effectively applied through the sprinkler system. Production can be increased by growing a mixture of grasses and legumes.

Range vegetation controls wind erosion, but overgrazing or improper haying methods reduce the protective cover and can allow severe wind erosion and creation of small blowouts, as well as decreasing the forage value of the vegetation. Proper grazing, deferred grazing or haying, and use of a planned grazing system maintain or improve range condition.

This soil is poor for planting trees and shrubs for windbreaks. Lack of moisture, wind erosion, and competition from weeds and grasses are the main limitations. Supplemental irrigation may be needed while windbreaks are being established. Wind erosion can be

reduced by maintaining sod between rows. Weeds and grasses can be controlled by cultivation or use of approved herbicides.

This soil readily absorbs the effluent from septic tank absorption fields, but it does not adequately filter the effluent. As a result, ground water may become polluted. Other sites should be found for sewage lagoons because of seepage. This soil is suited to dwellings, but excavations may slough or cave in unless shored. This soil is suited to local roads and streets. Small commercial buildings can be designed to fit the slope, or the soil can be graded to an acceptable slope.

This soil is in capability units VIe-5 dryland and IVe-11 irrigated, Sandy range site, and windbreak suitability group 7.

VbE—Valentine loamy fine sand, rolling. This deep, rolling, excessively drained soil is on uplands. Slope ranges from 9 to 17 percent. This soil formed in eolian sand. Individual areas range from 20 to 1,000 acres in size.

Typically, the surface layer is dark grayish brown, loose loamy fine sand about 4 inches thick. The next 3 inches is light brownish gray, loamy fine sand. The underlying material is very pale brown. It is loamy fine sand in the upper part and fine sand in the lower part to a depth of 60 inches. In some areas the surface layer is fine sand.

Included with this soil in mapping are small areas of less sloping Hersh soils. Hersh soils have more clay in the control section. Inclusions make up 10 to 20 percent of the map unit.

Permeability is rapid, and available water capacity is low. Runoff is slow. Organic matter content and natural fertility are low.

Nearly all of the acreage of this soil is rangeland used for grazing.

This soil is unsuitable for dryfarmed or irrigated crops because of the very severe hazard of wind erosion and the low moisture supply.

Range vegetation controls wind erosion, but overgrazing reduces the protective cover and can allow severe wind erosion and creation of small blowouts. Overgrazing also decreases the forage value of the vegetation. Proper grazing, deferred grazing, and use of a planned grazing system maintain or improve range condition.

This soil is a poor site for trees and shrubs for windbreaks. Wind erosion and lack of moisture are the main hazards to establishing windbreaks. Wind erosion can be prevented by planting trees and shrubs in shallow furrows with as little disturbance of the sod as possible. Supplemental irrigation can provide needed moisture.

This soil readily absorbs the effluent from septic tank absorption fields, but it does not adequately filter the effluent. As a result, ground water may become polluted. Other sites should be found for sewage lagoons because of seepage and slope. Dwellings can be designed to fit the slope. Excavations may slough or cave in unless shored. Cutting and filling modifies slope for local roads and streets. Wind erosion is a severe hazard, so minimal cutting is preferred.

This soil is in capability unit VIe-5 dryland, Sands range site, and windbreak suitability group 7.

use and management of the soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help in avoiding soil-related failures in land use.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland; for windbreaks; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where wetness or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

crops and pasture

By William E. Reinsch, conservation agronomist, Soil Conservation Service.

Thirty-two percent of Custer County is planted to crops. The largest acreage is in corn, followed by alfalfa hay and small grains. Minor crops are sorghum, oats, and soybeans. About 67 percent of the cropland is dryfarmed.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed soil map units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

dryfarming

Good management of dryfarmed crops reduces runoff and erosion, conserves moisture, and improves tilth. Most of the soils in Custer County are suitable for crops, although low rainfall limits production.

In many places the erosion hazard is severe but can be reduced by suitable conservation practices. Terraces, contour farming, grassed waterways, and crop residue left on the surface reduce water erosion.

Keeping crop residue on the surface or growing a protective plant cover reduces sealing and crusting of the soil during and after heavy rains. In winter, stubble catches drifting snow that can provide additional moisture.

Wind erosion is a major concern in Custer County. The same management practices that reduce water erosion are often effective in reducing wind erosion: crop residue use, conservation tillage, contour stripcropping, and narrow field windbreaks. The overall hazard of erosion can be reduced if the more productive soils are used for row crops and the steeper, more erodible soils and the sandy soils are used for close-grown crops, such as small grain, alfalfa, and hay and pasture. Proper land use alone can reduce erosion.

The best management practices to reduce erosion on Hobbs, Gibbon, and Boel soils of subclasses I, IIw, and IIIw are crop residue use, addition of fertilizer or barnyard manure, and good agronomic practices. On Holdrege soils of subclass IIe the best practices are letting crop residue stand on the soil over winter, contour farming, grassed waterways, and a conservation tillage system that leaves residue (1,500 pounds per acre of corn or

sorghum residue or 750 pounds of small grain residue) on the soil surface after planting. On Holdrege and Uly soils of subclasses IIIe and IVe the best practices are leaving crop residue on the soil over winter, contour farming, terraces, grassed waterways, and a conservation tillage system that leaves 2,000 pounds per acre of corn or sorghum residue or 1,000 pounds of small grain residue on the soil surface after planting. On slopes of more than 10 percent, water erosion is reduced to an acceptable level by growing grasses and legumes or by a conservation tillage system that leaves 3,000 pounds per acre of corn or sorghum residue or 1,500 pounds of small grain residue on the surface.

Soils of the Fillmore Variant and Scott series are subject to ponding. Where outlets are available, surface drainage can reduce crop losses.

The sequence of crops grown on a field in combination with the practices needed for the management and conservation of the soil is known as a cropping system. On dryfarmed soils, the cropping system should preserve tilth and fertility, maintain a plant cover that protects the soil from erosion, and control weeds, insects, and diseases. Cropping systems vary according to the soils on which they are used. For example, the crop sequence on Holdrege silt loam, 6 to 11 percent slopes, eroded, should include a high proportion of grass and legume crops. However, on Hall silt loam, 0 to 1 percent slopes, more row crops can be grown in the cropping sequence while maintaining the fertility and tilth of the soil and reducing erosion.

Soils are worked to prepare a seedbed, to control weeds, and to provide a favorable place for plants to grow. Excessive tillage, however, breaks down the granular structure that is needed for good tilth. The cultivation process should be limited to the essential steps. Various methods of conservation tillage can be used in Custer County. The conservation tillage systems of till-plant or disk-plant or chisel-and-plant are well suited to row crops. Grasses can be established by drilling into a cover of stubble on a well-prepared seedbed.

All soils that are used for cultivated crops or for pasture should be tested to determine their need for fertilizer. Under dryland management, the kind and amount of fertilizer to be applied should be based on results of soil tests and on the moisture content of the soil at time of application. When the subsoil is dry and rainfall is low, fertilizer should be applied at slightly lower rates than when the soil is moist. For nonlegume crops, nitrogen is beneficial on all soils. Phosphorus and zinc are needed on the more eroded soils or in cut areas after construction of terraces or diversions. Dryfarmed crops require less fertilizer because there is generally a lower plant population.

Herbicides control weeds; however, care should be taken in applying the correct kind at the proper rate to correspond with soil conditions. The collodial clay and humus in the soil is responsible for the greatest part of the chemical activity of the soil. Therefore, crop damage from herbicides can occur on sandy soils (low in collodial clay) and in areas where the organic matter content is moderately low to low. Consequently, application rates of herbicides need to be lower on these soils. Keeping field boundaries on the contour helps to maintain the organic matter content in the field, thereby lessening the danger of damage to crops from herbicides.

Irrigation

About 33 percent of the cropland in Custer County is irrigated. Corn is grown on 86 percent of the irrigated cropland. A smaller acreage is in alfalfa hay. Both furrow systems and sprinkler systems are suitable for corn, sorghum, and soybeans. Alfalfa can be irrigated by border, contour ditch, corrugation, or sprinkler systems (fig. 10). The irrigation water comes from wells, irrigation canals, streams, and the Middle and South Loup Rivers.

The cropping system on soils that are well suited to irrigation consists mostly of row crops. A cropping sequence that includes different row crops, small grain, and alfalfa or grass helps to control the cycle of disease and insects that are commonly present if the same crop is grown year after year. Gently sloping soils, such as Holdrege silt loam, 3 to 6 percent, are subject to water erosion if they are furrow irrigated down the slope. Such soils can be contour bench leveled or irrigated by contour furrows on parallel terraces.

Land leveling distributes water evenly and increases the efficiency of irrigation. The efficiency of furrow irrigation can be improved by adding a tailwater recovery system. Sprinkler irrigation is most satisfactory on coarser textured soils if adequate water is available. Terraces, contour farming, and contour bench leveling can be used on irrigated land in addition to contour furrows. Grassed waterways and crop residue kept on the surface reduce water erosion on soils irrigated by sprinklers.

Some irrigated soils, such as Holdrege silt loam, 3 to 6 percent slopes, eroded, and Gates very fine sandy loam, 6 to 11 percent slopes, need the same conservation practices to control water erosion as nonirrigated soils. These practices include terraces, contour farming, and leaving crop residue on the soil after planting. These practices are important in conserving rainfall, slowing evaporation, increasing water intake, and protecting the soil from erosion.

A soil holds only a limited amount of water. Irrigation water, therefore, is applied at regular intervals to keep the root zone moist at all times. The interval varies according to the crop and the time of year. Water should be applied only as fast as the soil can absorb it.

Irrigated silt loam and silty clay loam soils in Custer County can hold about 2 inches of available water per foot of soil depth. A soil that is 4 feet deep and planted

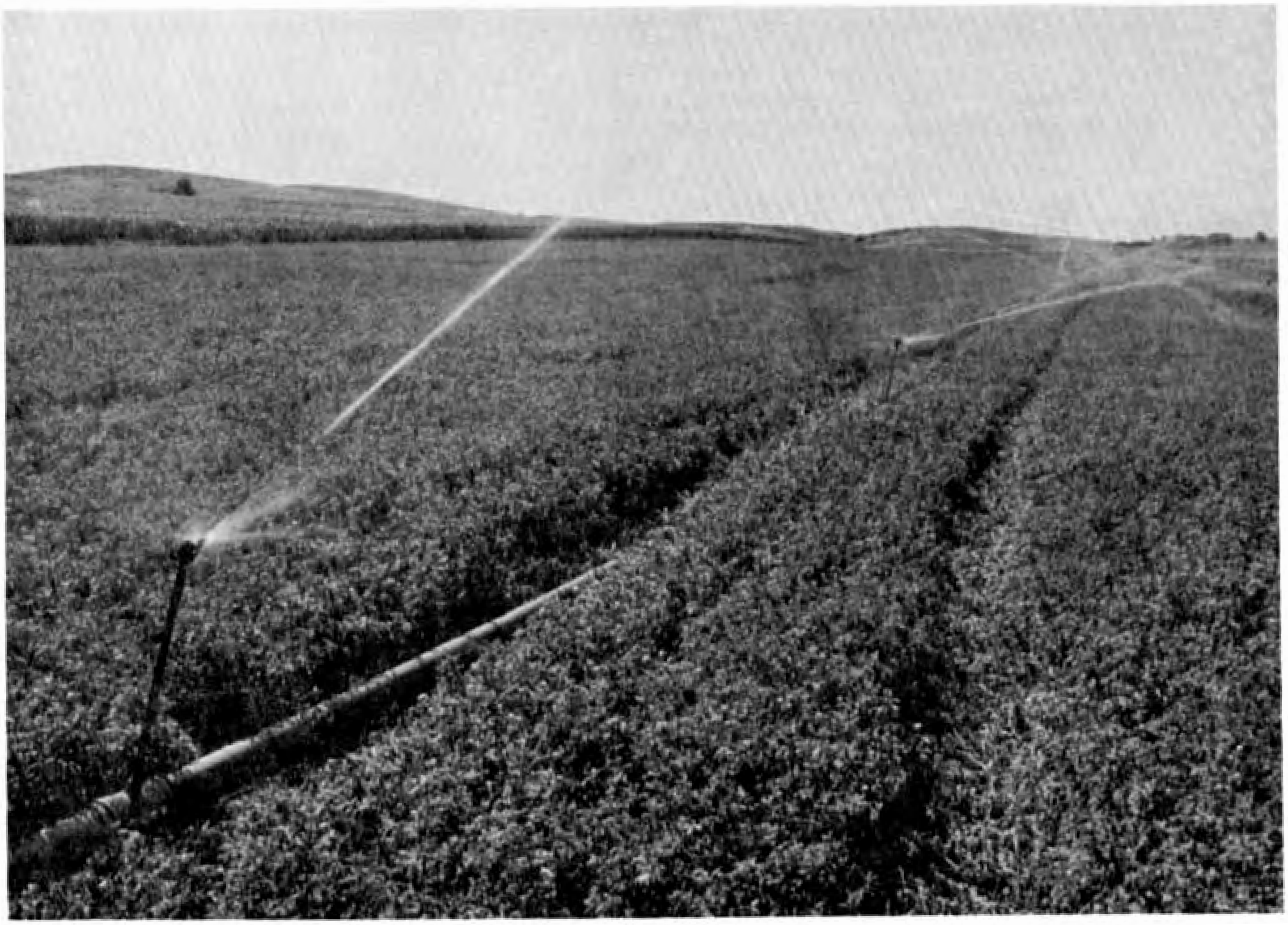

Figure 10.—Sprinkler irrigation of alfalfa on Hobbs silt loam, 0 to 2 percent slopes.

to a crop that sends its roots to that depth can supply about 8 inches of water to that crop.

Irrigation should be planned to replace the water that is removed by the crop. Maximum efficiency for furrow irrigation is obtained if irrigation is started when about half of the stored water has been used by the plants. Thus, if a soil holds 8 inches of available water, irrigation should be started when about 4 inches has been removed.

A tailwater recovery pit at the end of a furrow-irrigated field traps excess irrigation water that runs off. The water can then be pumped to the upper end of the field and used again. This practice increases the efficiency of the irrigation system and helps to conserve ground water.

In sprinkler irrigation, water is applied by sprinklers at a rate that the soil can absorb without runoff. Sprinkler systems are of two general kinds: those that are set at a certain location and operate there until a specified amount of water has been applied; and the center-pivot type, which revolves about a central point.

Sprinklers can be used on the more sloping soils as well as on the nearly level soils. Some soils, such as Hersh fine sandy loam, 3 to 6 percent slopes, are suited to sprinkler irrigation if erosion-control measures are used. Because application of water can be carefully controlled, sprinklers have special value for soil conservation, as in establishing new pasture on moderately steep soils. In summer, however, much water is lost by evaporation. Wind drift can cause uneven application of water under some sprinkler systems.

All of the soils in Nebraska are placed in irrigation design groups (*6*). Arabic numbers of the irrigated capability units indicate the irrigation design group to which the soils belong.

Assistance in planning and designing an irrigation system is available through the local office of the Soil Conservation Service or the county agricultural agent. Estimates concerning cost of irrigation equipment can be obtained from local dealers and manufacturers.

pasture and hay

Areas in hay or pasture should be managed for maximum production (fig. 11). Once the pasture has been established, the grasses need to be kept productive. A planned grazing system that meets the needs of the plants and promotes uniform utilization of forage produces the highest returns for that soil. Most forage plants are a good source of minerals, vitamins, proteins, and other nutrients, and a well managed pasture can provide a balanced ration for livestock throughout the growing season.

A mixture of grasses and legumes can be grown on many kinds of soil and with proper management can return a fair profit. Grasses and legumes are compatible with grains in the crop rotation. Because grasses and legumes improve tilth, add organic matter, and reduce erosion, they are ideal for use in a conservation cropping system. Cropland can be converted to irrigated pasture to control erosion.

Grasses and legumes used for pasture and hay, either irrigated or dryfarmed, require additional nutrients for maximum vigor and growth. The kinds and amounts of fertilizer needed should be determined by soil tests.

The most commonly grown grasses for irrigated pasture are smooth brome and orchardgrass. Also suitable for irrigation in Custer County are intermediate wheatgrass, meadow brome, and creeping foxtail.

Figure 11.—Hay from an area of pasture on Holdrege silt loam soils.

Irrigated pasture in Custer County can produce 750 to 900 pounds of beef per acre under a high level of management.

Smooth brome, intermediate wheatgrass, meadow brome, tall fescue, and orchardgrass can be used for pasture without irrigation. Some native warm-season grasses, when planted as a single species on nonirrigated land, are compatible with cool season pasture to extend the availability of quality forage during the grazing season. Switchgrass, indiangrass, and big bluestem are native warm-season grasses that can be used in a planned grazing system to provide high quality forage in summer.

Legumes suitable for irrigated or nonirrigated pasture are alfalfa, birdsfoot trefoil, and cicer milkvetch.

yields per acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green-manure crops; and harvesting that insures the smallest possible loss.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils.

land capability classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops

that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor does it consider possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. These levels are defined in the following paragraphs.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have slight limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

Capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-1 or IIIe-3.

The acreage of soils in each capability class and subclass is shown in table 6. The capability classification of each map unit is given in the section "Detailed soil map units."

prime farmland

Prime farmland, as defined by the U.S. Department of Agriculture, is the land that is best suited to producing food, feed, forage, fiber, and oilseed crops. The soil quality, growing season, and moisture supply are suitable for economically producing sustained high yields of crops if the land is treated and managed using acceptable farming methods. Prime farmland produces the highest yields with minimal inputs of energy and economic resources, and farming it results in the least damage to the environment. Prime farmland is of major importance in satisfying the nation's short- and long-term needs for food and fiber. The supply of high quality farmland is limited, and it should be used with wisdom and foresight.

Prime farmland must either be currently used for producing food or fiber or be available for this use. It may be in crops, pasture, timber, or other uses except urban or built-up land or water areas.

Soils that have limitations, such as a high water table, flooding, or inadequate rainfall, may qualify as prime farmland if the limitations are overcome by such measures as drainage, flood control, or irrigation. On-site evaluation is necessary to determine if the limitations have been overcome.

A recent trend in land use in some parts of the county has been the loss of prime farmland to industrial and urban uses. This loss puts pressure on marginal land, which generally is more erodible, more droughty, and more difficult to cultivate than prime farmland and is usually less productive.

About 350,270 acres (21 percent) of Custer County is prime farmland. The soils that meet the requirements for prime farmland are listed here. Urban or built-up areas of the listed soils are not prime farmland. This listing does not constitute land use recommendations. The extent of each listed map unit is given in table 4, and the location of the map units is shown on the detailed soil maps at the back of this publication. The soil qualities that affect use and management are described in the section "Detailed soil map units."

The following soils are prime farmland in Custer County:

An	Anselmo fine sandy loam, 0 to 2 percent slopes
AnC	Anselmo fine sandy loam, 2 to 6 percent slopes
Ao	Anselmo very fine sandy loam, 0 to 1 percent slopes
AoB	Anselmo very fine sandy loam, 1 to 3 percent slopes
Ca	Cass fine sandy loam, 0 to 2 percent slopes
Cs	Cozad silt loam, 0 to 1 percent slopes
CsC	Cozad silt loam, 3 to 6 percent slopes
Cz	Cozad silt loam, terrace, 0 to 1 percent slopes
CzB	Cozad silt loam, terrace, 1 to 3 percent slopes
GfC	Gates very fine sandy loam, 3 to 6 percent slopes
Gk	Gibbon silt loam, 0 to 1 percent slopes [1]
Gr	Graybert very fine sandy loam, 0 to 1 percent slopes
GrB	Graybert very fine sandy loam, 1 to 3 percent slopes
GrC	Graybert very fine sandy loam, 3 to 6 percent slopes
Ha	Hall silt loam, 0 to 1 percent slopes
HaB	Hall silt loam, 1 to 3 percent slopes
HeB	Hersh fine sandy loam, 0 to 3 percent slopes
HeC	Hersh fine sandy loam, 3 to 6 percent slopes
Hk	Hobbs silt loam, 0 to 2 percent slopes
HoB	Holdrege silt loam, 1 to 3 percent slopes
HoC	Holdrege silt loam, 3 to 6 percent slopes
HoC2	Holdrege silty clay loam, 3 to 6 percent slopes, eroded
HpB	Hord fine sandy loam, 0 to 3 percent slopes
Hr	Hord silt loam, 0 to 1 percent slopes
HrB	Hord silt loam, 1 to 3 percent slopes
HrC	Hord silt loam, 3 to 6 percent slopes
Ht	Hord silt loam, terrace, 0 to 1 percent slopes
HtB	Hord silt loam, terrace, 1 to 3 percent slopes
Ks	Kenesaw very fine sandy loam, 0 to 1 percent slopes
KsB	Kenesaw very fine sandy loam, 1 to 3 percent slopes
Or	Ord very fine sandy loam, 0 to 1 percent slopes
Ov	Ovina loam, 0 to 2 percent slopes
Ru	Rusco silty clay loam, 0 to 1 percent slopes

[1] Where drained. This soil generally has been adequately drained, either by the application of drainage measures or by incidental drainage resulting from farming operations, road building, or other land development.

rangeland

By Peter N. Jensen, range conservationist, Soil Conservation Service.

The raising of livestock, mainly cow-and-calf herds with feeder calves sold in fall, is the largest agricultural industry in Custer County. The average size of ranches and livestock farms is about 1,500 acres.

Rangeland makes up about 64 percent of the agricultural land in Custer County. The rangeland is scattered throughout the county. The greatest concentration is in the loess hills in the southern and eastern parts of the county and in the sandhills in the northwest. Range is common in the Valentine, Valentine, rolling and hilly, Valentine-Els, Uly-Coly, Ipage-Valentine, and Boel-Barney-Gannett associations.

Each soil has been placed in a range site. Most of the range is in the Silty, Limy Upland, Thin Loess, Sandy, Sands, and Choppy Sands range sites. The rest is in the Wetland, Wet Subirrigated, Subirrigated, Silty Overflow, Sandy Lowland, and Silty Lowland range sites. Interpretations for each range site are available from the local office of the Soil Conservation Service.

Range is generally grazed from late spring to early fall. The livestock graze aftermath of corn or grain sorghum in fall and early winter, and they are fed hay (alfalfa and native) and silage for the rest of the winter. The native forage is commonly supplemented with protein. Some of the range has been depleted by overuse and supports low-producing grasses, forbs, and shrubs. Productivity of the range can be increased by sound management, which consists of proper grazing, deferment, planned grazing systems, and brush or weed control (fig. 12).

Technical assistance in converting cropland to rangeland, in setting up planned grazing systems, or in other aspects of a sound range improvement program is also available from the local office of the Soil Conservation Service.

In areas that have similar climate and topography, differences in the kind and amount of vegetation produced on rangeland are closely related to the kind of soil. Effective management is based on the relationship between the soils and vegetation and water.

Table 7 shows, for each soil, the range site; the total annual production of vegetation in favorable, normal, and unfavorable years; the characteristic vegetation; and the average percentage of each species. Only those soils that are used for or are suited to rangeland are listed. Explanation of the column headings in table 7 follows.

A *range site* is a distinctive kind of rangeland that produces a characteristic natural plant community that differs from natural plant communities on other range sites in kind, amount, and proportion of range plants. The relationship between soils and vegetation was established during this survey; thus, range sites generally can be determined directly from the soil map. Soil properties that affect moisture supply and plant nutrients

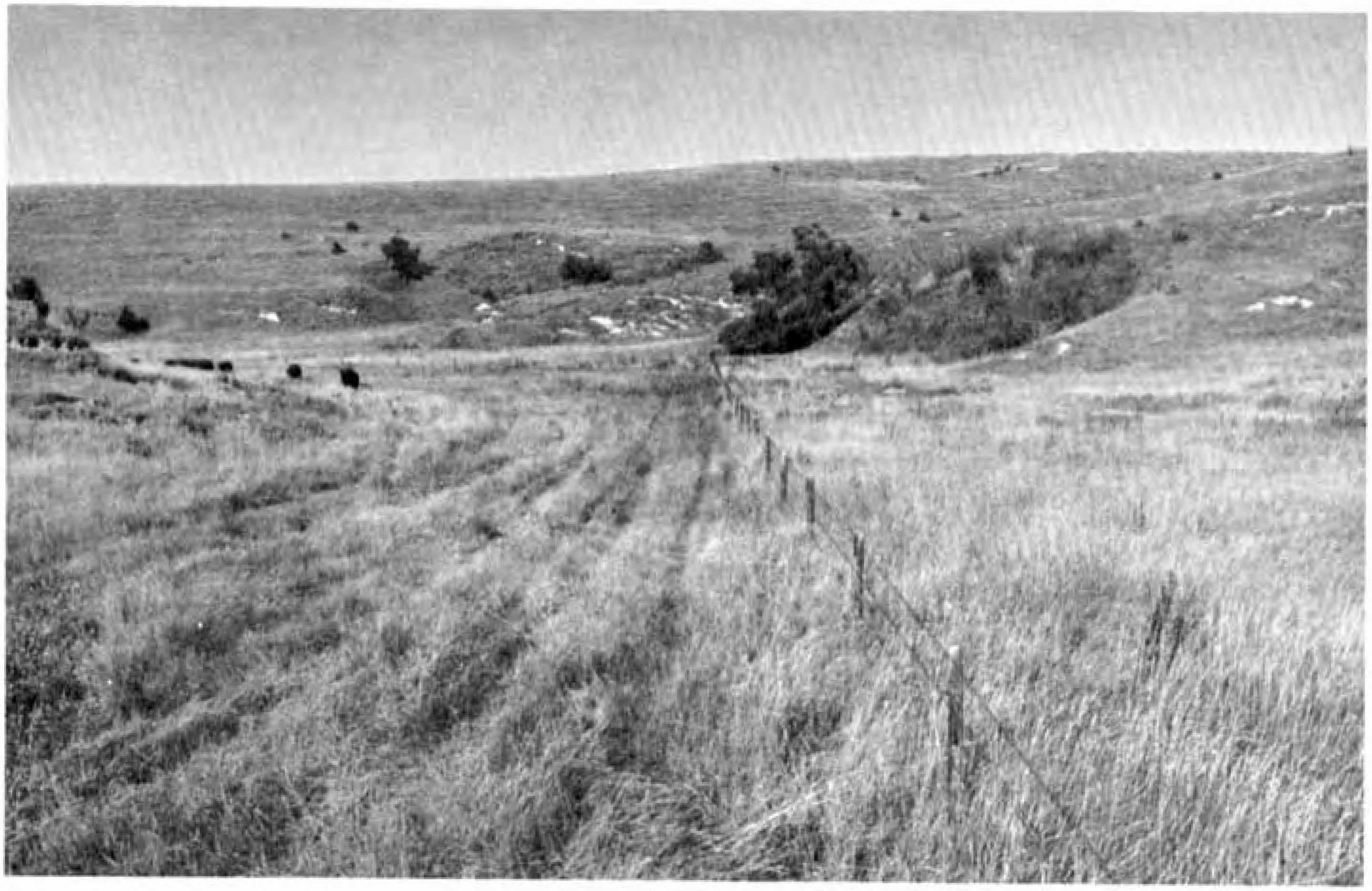

Figure 12.—Cross-fencing range aids deferred grazing; Coly-Uly association.

have the greatest influence on the productivity of range plants. Soil reaction, salt content, and a seasonal high water table are also important.

Total production is the amount of vegetation that can be expected to grow annually on well managed rangeland that is supporting the potential natural plant community. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruits of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year, the amount and distribution of precipitation and the temperatures make growing conditions substantially better than average. In a normal year, growing conditions are about average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture.

Dry weight is the total annual yield per acre reduced to a common percentage of air-dry moisture.

Characteristic vegetation—the grasses, forbs, and shrubs that make up most of the potential natural plant community on each soil—is listed by common names. Under *composition*, the expected percentage of the total annual production is given for each species making up the characteristic vegetation. The amount that can be used as forage depends on the kinds of grazing animals and on the grazing season.

Range management requires a knowledge of the kinds of soil and of the potential natural plant community. It also requires an evaluation of the present range condition. Range condition is determined by comparing the present plant community with the potential natural plant community on a particular range site. The more closely the existing community resembles the potential community, the better the range condition. Range condition is an ecological rating only. It does not have a specific meaning that pertains to the present plant community in a given use.

The objective in range management is to control grazing so that the plants growing on a site are about

the same in kind and amount as the potential natural plant community for that site. Such management generally results in the optimum production of vegetation, reduction of undesirable brush species, conservation of water, and control of water erosion and soil blowing. Sometimes, however, a range condition somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

native meadow

Several thousand acres of the rangeland in Custer County is used for the production of native hay (fig. 13). Meadows usually occur where the water table is high, and generally they are in the Wetland, Wet Subirrigated, and Subirrigated range sites. The dominant vegetation in the native meadows is big bluestem, little bluestem, switchgrass, indiangrass, prairie cordgrass, reedgrasses, and sedges. Mowing has reduced the population of native forbs.

Production in native meadow can be maintained or improved by proper management. The best time for mowing is just before the emergence of the grass flowers (which is called the boot stage). Maximum storage of carbohydrates occurs when the seed is ripe or mature. This period coincides with the frost period for the dominant grasses. When the meadows are cut earlier, the grasses are higher in quality and this is reflected later through better livestock gains.

Mowing height is important in maintaining the stand of grasses and high forage production. To maintain high plant vigor, meadows should not be mowed closer than 3 inches.

Figure 13.—Native hay meadow on Subirrigated range site; Boel loamy fine sand, 0 to 2 percent slopes.

Meadows should not be grazed when the soil is wet or when the water table is within six inches of the surface. Deferment in this manner will prevent formation of small bogs or mounds and the consequent difficulty in mowing during later years. Meadows can be grazed for the aftermath or regrowth after frost.

windbreaks and environmental plantings

By Keith A. Ticknor, forester, Soil Conservation Service.

Many ranch headquarters and farmsteads in Custer County have trees around them that have been planted at various times (fig. 14). In addition, many shelterbelts and livestock windbreaks have been planted throughout the county. Early settlers planted trees to protect headquarters, livestock, crops, and families from climatic extremes. Trees are still planted for the same reason.

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind, hold snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To insure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Table 8 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in table 8 are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from local offices of the Soil Conservation Service or the Cooperative Extension Service or from a nursery.

Trees and shrubs selected for windbreaks should be adapted to the soils in the area to be planted. Matching the trees to the soil is the first step towards insuring survival and maximum growth. Permeability, available water capacity, and fertility of the soil greatly affect the rate of growth of trees and shrubs in windbreaks. Recommended species of trees and shrubs for each soil are given in table 8.

Conifers (cedar, pine, and spruce) should be part of most windbreaks. They stop snow, and they retain their

Figure 14.—Windbreaks protect farmsteads, livestock, and crops; Holdrege silt loam, 1 to 3 percent slopes.

leaves through winter, giving maximum protection when it is most needed.

Moisture is limiting for tree survival in Custer County. Therefore, properly preparing the site prior to planting and controlling weeds and other competition after planting are the major concerns in establishing and managing a windbreak. Supplemental watering by drip irrigation also overcomes moisture deficiencies.

Many of the older windbreaks and shelterbelts are now deteriorating because of crowding or because short-lived trees and shrubs have passed maturity. These windbreaks can be renovated.

Each soil is placed in a windbreak suitability group. Interpretations for each windbreak suitability group are available from the local office of the Soil Conservation Service. Technical help in establishing and improving windbreaks or in other aspects of planting trees and shrubs can also be obtained from the Soil Conservation Service.

Natural woodland grows on the bottom lands of rivers and their tributaries. Woody plants also grow in the steep, silty soils of upland canyons. Some wooded areas could produce commercial wood products, but most are unmanaged and are retained for watershed protection and wildlife habitat.

Eastern redcedar, green ash, boxelder, eastern cottonwood, American plum, and common chokecherry are the major woody species found in the canyons. The bottom lands support eastern cottonwood, black willow, eastern redcedar, dogwood, Russian olive, American elm, and other trees that tolerate wetness. Only eastern cottonwood and green ash currently have commercial value.

recreation

By Robert O. Koerner, biologist, Soil Conservation Service.

The Arnold State Recreation Area near Arnold contains 18 acres of land and a 22-acre lake. Victoria Springs State Recreation Area, east of Anselmo, contains 59 acres of land and a small lake. The Arcadia Diversion Dam is a special use area containing 816 acres of land and 109 acres of water. Pressey Special Use Area has 1,614 acres of land and 7 acres of water. The parks offer hiking, bird watching, picnicking, camping, fishing, boating, and hunting.

Largemouth bass, bluegill, catfish, suckers, carp, minnows, and other kinds of fish are found in farm ponds and the Loup Rivers in addition to the recreation areas and special use areas. Rainbow trout are fished at Victoria Springs on a put-and-take basis and are also stocked in a few private spring-fed ponds. Mourning dove are found throughout the county.

The soils of the survey area are rated in table 9 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 9, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 9 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 12 and interpretations for dwellings without basements and for local roads and streets in table 11.

Camp areas require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface absorbs rainfall readily but remains firm and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is firm after rains and is not dusty when dry.

Paths and trails for hiking, horseback riding, and bicycling should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes. The suitability of the soil for tees or greens is not considered in rating the soils.

wildlife habitat

By Robert O. Koerner, biologist, Soil Conservation Service.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 10, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and grain sorghum.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, intermediate wheatgrass, smooth brome, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are big and little bluestem, goldenrod, giant ragweed, western wheatgrass, and blue grama.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, the available water capacity, and wetness. Examples of these plants are oak, green ash, hackberry, Washington hawthorn, apple, Russian mulberry, honeylocust, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are native plum, common lilac, cotoneaster, and skunkbush sumac.

Coniferous plants furnish browse, seeds, and cones. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are Scotch, Austrian, and ponderosa pine and redcedar.

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, and foliage. Soil properties and features that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and soil moisture. Examples of shrubs are native plum, cotoneaster, lilac, rose, and aromatic sumac.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, and slope. Examples of wetland plants are smartweed, wild millet, prairie cordgrass, rushes, sedges, and reed grasses.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, ring-necked pheasant, meadowlark, field sparrow, cottontail rabbit, and skunk.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include cottontail rabbit, bobwhite quail, opossum, thrushes, woodpeckers, squirrels, raccoon, and deer.

Habitat for wetland wildlife consists of open, marshy or swampy, shallow-water areas. Some of the wildlife attracted to such areas are ducks, geese, shore birds, muskrat, mink, and beaver.

Habitat for rangeland wildlife consists of areas of shrubs and wild herbaceous plants. Wildlife attracted to rangeland include badger, antelope, deer, prairie grouse, meadowlark, and lark bunting.

Openland wildlife is found in the cropped areas. Rangeland wildlife is found in areas of pasture and range. Wetland wildlife is found along the rivers and water areas, and woodland wildlife is found in wooded areas adjacent to the rivers and streams.

The Valentine, rolling and hilly, Valentine, Valentine-Els, and Ipage-Valentine associations are rangeland. Warm-season grasses, such as sand bluestem, prairie sandreed, and sideoats grama, predominate. Rangeland wildlife includes coyote, prairie grouse, prairie dog, meadowlark, bobolink, and lark bunting.

The areas of the Valentine-Els association having a high water table support prairie cordgrass, switchgrass, reedgrass, and sedges. Many shore birds and other wetland species are found in these areas.

The Uly-Coly and Gates-Hersh associations are open land (fig. 15). The landscape is rolling and has many steep-sided drainageways with trees and shrubs, such as green ash, boxelder, cottonwood, redcedar, native plum, and chokecherry. Wildlife species include pheasant and bobwhite quail, skunk, jackrabbit, porcupine, coyote, whitetail and mule deer, hawks, owls, eagles, lark bunting, and meadowlark. There is good interspersion of cover types. The land that is not too steep is farmed, and the rougher land is in grass and provides nesting cover.

The Holdrege-Hall-Hord, Hord-Cozad, Cozad, and Hord-Hall-Cozad associations are open land. A large

Figure 15.—Coly-Hobbs silt loams, 2 to 60 percent slopes, provides excellent wildlife habitat.

portion of the area is cropped to grain sorghum, wheat, corn, and alfalfa. Shelterbelts are located around farmsteads. Some pasture is found in these associations.

During wet years, a few depressions in the Holdrege-Hall-Hord association contain water and provide habitat for waterfowl and shore birds. The depressions also attract many other species of wildlife, such as coyote, pheasant, bobwhite quail, and deer. The riparian habitat in the Anselmo-Cozad, Cozad, and Hord-Cozad associations harbors deer, tree squirrels, raccoon, fox, opossum, songbirds, hawks, owls, and eagles.

The Hersh-Gates-Kenesaw, Kenesaw-Hord-Gates, and Anselmo-Cozad associations are also open land. They have a good diversity of cover types with interspersion of cropland, range, and pasture. Whitetail and mule deer, coyote, pheasant, bobwhite quail, skunk, opossum, raccoon, shore birds, and waterfowl can be found.

The Boel-Barney-Gannett association supports openland wildlife. The bottom lands are commonly used for range. The riparian habitat harbors coyote, deer, tree squirrels, and raccoon as well as many songbirds, waterfowl, and shore birds. Escape cover and winter food is found in the woody understory of such plants as plum, chokecherry, dogwood, buckbrush, gooseberry, and currant.

engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations.

For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

building site development

Table 11 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope,

and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

sanitary facilities

Table 12 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 12 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 60 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, and flooding affect absorption of the effluent.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to effectively filter the effluent. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 12 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope can cause construction problems.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation need to be considered.

The ratings in table 12 are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, slope, and flooding affect both types of landfill. Texture, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

construction materials

Table 13 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help in determining the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by a high water table and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, and slope of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, or slope of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 13, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They have little or no gravel and have slope of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel or soluble salts, or soils that have slope of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

water management

Table 14 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and for embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not

favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by slope and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope and wetness affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Wetness and slope affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

soil properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 18.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

engineering index properties

Table 15 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil series and their morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains particles coarser than sand, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (*1*).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as Pt. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested, with group index numbers in parentheses, is given in table 18.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an oven-dry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

physical and chemical properties

Table 16 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earth-moving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3 bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to wind erosion in cultivated areas. The groups indicate the susceptibility of soil to wind erosion and the amount of soil lost. Soils are grouped according to the following distinctions:

1. Sands, coarse sands, fine sands, and very fine sands. These soils are generally not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.

2. Loamy sands, loamy fine sands, and loamy very fine sands. These soils are very highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

3. Sandy loams, coarse sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

4L. Calcareous loamy soils that are less than 35 percent clay and more than 5 percent finely divided calcium carbonate. These soils are erodible. Crops can be grown if intensive measures to control wind erosion are used.

4. Clays, silty clays, clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control wind erosion are used.

5. Loamy soils that are less than 18 percent clay and less than 5 percent finely divided calcium carbonate and sandy clay loams and sandy clays that are less than 5 percent finely divided calcium carbonate. These soils are slightly erodible. Crops can be grown if measures to control wind erosion are used.

6. Loamy soils that are 18 to 35 percent clay and less than 5 percent finely divided calcium carbonate, except silty clay loams. These soils are very slightly erodible. Crops can easily be grown.

7. Silty clay loams that are less than 35 percent clay and less than 5 percent finely divided calcium carbonate. These soils are very slightly erodible. Crops can easily be grown.

8. Stony or gravelly soils and other soils not subject to wind erosion.

Organic matter is the plant and animal residue in the soil at various stages of decomposition.

In table 16, the estimated content of organic matter of the plow layer is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

soil and water features

Table 17 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt and water in swamps and marshes are not considered flooding.

Table 17 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, common, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *common* that it is likely under normal conditions; *occasional* that it occurs on an average of once or less in 2 years; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than

that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 17 are the depth to the seasonal high water table; the kind of water table—that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 17.

An apparent water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. An artesian water table is under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole. A perched water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured clayey soils that have a high water table in winter are most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

physical and chemical analyses of selected soils

Soil samples were collected for physical and chemical analysis by the Soil Conservation Service Soil Survey Laboratory in Lincoln, Nebraska. Soils of the Anselmo series were sampled in Custer County and soils of the Cass, Hall, Holdrege, Hord, Kenesaw, and Valentine series were sampled in nearby counties. These data are recorded in Soil Survey Investigations Report Number 5 (*5*).

This information helps soil scientists in classifying soils and developing concepts of soil genesis. It is also helpful in estimating available water capacity, susceptibility to wind erosion, fertility, tilth, and other practical aspects of soil management.

engineering index test data

Table 18 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The pedons are typical of the series and are described in the section "Soil series and their morphology." The soil samples were tested by the Nebraska Department of Roads.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are: AASHTO classification—M 145 (AASHTO), D 3282 (ASTM) (group index computed by the Nebraska modification system); Unified classification—D 2487 (ASTM); Mechanical analysis—T 88 (AASHTO), D 2217 (ASTM); Liquid limit—T 89 (AASHTO), D 423 (ASTM); Plasticity index—T 90 (AASHTO), D 424 (ASTM); Specific gravity—T 100 (AASHTO).

classification of the soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*7*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. In table 19, the soils of the survey area are classified according to the system. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Mollisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Ustoll (*Ust*, meaning burnt (dry climate), plus *mol*, from Mollisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Argiustolls (*Argi*, meaning maximal horizonation, plus *ustoll*, the suborder of the Mollisols that have an ustic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Argiustolls.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-silty, mixed, nonacid, mesic Typic Argiustolls.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

soil series and their morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the Soil Survey Manual (*4*). Many of the technical terms used in the descriptions are defined in Soil Taxonomy (*7*). Unless otherwise stated, colors in the descriptions are for dry soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed soil map units."

Anselmo series

The Anselmo series consists of deep, well drained, moderately rapidly permeable soils on uplands and stream terraces. They formed in mixed loamy eolian material. Slope ranges from 0 to 6 percent.

Anselmo soils are similar to Hersh soils and commonly are adjacent to Dunday soils on stream terraces and Gates, Kenesaw, Hersh, and Valentine soils in valleys and on uplands. Hersh and Valentine soils do not have a mollic epipedon. Dunday and Valentine soils have more

sand throughout. Gates and Kenesaw soils have more clay and less sand throughout.

Typical pedon of Anselmo fine sandy loam, 0 to 2 percent slopes, 2,110 feet east and 1,050 feet south of the northwest corner of sec. 35, T. 20 N., R. 22 W.:

Ap—0 to 7 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable; neutral; abrupt smooth boundary.

A12—7 to 14 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure parting to weak fine granular; soft, very friable; neutral; clear smooth boundary.

B2—14 to 22 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 5/3) moist; weak medium prismatic structure parting to weak medium subangular blocky; soft, very friable; neutral; clear smooth boundary.

C—22 to 60 inches; light gray (10YR 7/2) fine sandy loam, pale brown (10YR 6/3) moist; massive; soft, very friable; neutral.

The thickness of the solum ranges from 11 to 27 inches. Thickness of the mollic epipedon ranges from 7 to 16 inches. Some pedons have free carbonates below a depth of from 30 to 60 inches.

The A horizon has color value of 3 to 5 (2 or 3 moist) and chroma of 1 or 2. It is fine sandy loam, very fine sandy loam, or loamy fine sand. Reaction is slightly acid or neutral. The B horizon has color value of 5 or 6 (4 or 5 moist) and chroma of 2 or 3. Reaction is neutral or mildly alkaline. The C horizon has color value of 5 to 7 (4 to 6 moist) and chroma of 2 to 4. It is commonly fine sandy loam but in places is loamy fine sand or fine sand in the lower part. Reaction is neutral to moderately alkaline.

Barney series

The Barney series consists of deep, poorly drained soils on bottom lands. Permeability is moderately rapid in the upper part and rapid in the underlying sand. Barney soils formed in sandy alluvium. The upper part of the profile is loamy and the lower part is sandy. Slope ranges from 0 to 2 percent.

Barney soils are commonly adjacent to Boel, Gannett, and Loup soils. Boel soils are in slightly higher positions than Barney soils and are somewhat poorly drained. Gannett soils have less sand throughout the profile. Loup soils have a mollic epipedon.

Typical pedon of Barney fine sandy loam, 0 to 2 percent slopes, 200 feet south and 2,640 feet east of the northwest corner of sec. 26, T. 20 N., R. 21 W.:

A1—0 to 7 inches; very dark grayish brown (10YR 3/2) fine sandy loam, very dark brown (10YR 2/2) moist; weak fine granular structure; soft, very friable; few thin strata of finer textured material; violent effervescence; moderately alkaline; abrupt smooth boundary.

C1—7 to 14 inches; very pale brown (10YR 7/3) fine sand, brown (10YR 5/3) moist; common medium distinct strong brown (7.5YR 5/6) mottles; single grained; loose; thin strata of finer textured material; mildly alkaline; clear smooth boundary.

C2—14 to 24 inches; light gray (10YR 7/2) fine sand, grayish brown (10YR 5/2) moist; single grained; loose; thin strata of loamy fine sand; mildly alkaline; clear smooth boundary.

C3—24 to 60 inches; very pale brown (10YR 7/3) sand with thin strata of fine sand and coarse sand, brown (10YR 5/3) moist; single grained; loose; mildly alkaline.

The thickness of the solum ranges from 7 to 10 inches.

The A horizon has color value of 3 to 4 (2 or 3 moist) and chroma of 1 or 2. It is dominantly fine sandy loam, but the range includes very fine sandy loam and silt loam. The C horizon has hue of 2.5Y, 5Y, and 10YR; value of 7 to 8 (5 or 6 moist); and chroma of 2 or 3. Reaction ranges from neutral to moderately alkaline throughout the profile.

Barney Variant

The Barney Variant consists of deep, very poorly drained soils on bottom lands. They are moderately rapidly permeable and formed in alluvium. The upper part of the profile is loamy and the lower part is sandy. Slope ranges from 0 to 1 percent.

Barney Variant soils are commonly adjacent to Barney, Boel, Gannett, and Loup soils. Boel soils are somewhat poorly drained and are in higher positions. Barney, Gannett, and Loup soils are poorly drained.

Typical pedon of Barney Variant loam, 0 to 1 percent slopes, 200 feet east and 800 feet north of the southwest corner of sec. 30, T. 13 N., R. 18 W.

A1—0 to 14 inches; gray (10YR 5/1) loam, very dark gray (10YR 3/1) moist; weak fine granular structure; slightly hard, friable; few thin strata of finer textured material; on the surface is a layer of partially decayed leaves and stems; strong effervescence; moderately alkaline; abrupt smooth boundary.

C—14 to 27 inches; gray (10YR 5/1) very fine sandy loam, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable; few thin strata of finer or coarser textured material; violent effervescence; moderately alkaline; abrupt smooth boundary.

C2—27 to 50 inches; light gray (10YR 7/1) fine sand, dark gray (10YR 4/1) moist; single grained; loose; few thin strata of finer or coarser textured material; strong effervescence; mildly alkaline; abrupt smooth boundary.
C3—50 to 60 inches; gray (5YR 6/1) very fine sandy loam, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable; few thin strata of finer or coarser textured material; strong effervescence; mildly alkaline.

The thickness of the solum ranges from 7 to 18 inches.

The A horizon has color value of 3 to 5 (2 or 3 moist) and chroma of 1 or 2. It is dominantly loam, but the range includes very fine sandy loam and fine sandy loam. The C horizon has hue of 2.5Y, 5Y and 10YR; value of 5 to 7 (dry or moist); and chroma of 1 to 3. The C horizon is very fine sandy loam or fine sandy loam, and the IIC horizon is fine sand to very fine sandy loam.

Boel series

The Boel series consists of deep, somewhat poorly drained, rapidly permeable soils on bottom lands. They formed in sandy alluvium . Slope ranges from 0 to 3 percent.

Boel soils are adjacent to Barney, Gibbon, Inavale, and Ord soils. Barney soils are in lower positions and are poorly drained. Gibbon and Ord soils have less sand throughout the profile. Inavale soils typically do not have carbonates and are somewhat excessively drained.

Typical pedon of Boel loamy fine sand, 0 to 2 percent slopes, 700 feet north and 800 feet east of the southwest corner of sec. 10, T. 14 N., R. 21 W.:

A1—0 to 10 inches; dark grayish brown (10YR 4/2) loamy fine sand, very dark gray (10YR 3/1) moist; weak fine granular structure; soft, very friable; slight effervescence; mildly alkaline; clear smooth boundary.
AC—10 to 16 inches; grayish brown (10YR 5/2) loamy fine sand, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; loose; slight effervescence; mildly alkaline; clear smooth boundary.
C1—16 to 52 inches; light brownish gray (10YR 6/2) fine sand, grayish brown (10YR 5/2) moist; few medium distinct brown (7.5YR 5/4) mottles; single grained; slight effervescence, moderately alkaline; clear smooth boundary.
C2—52 to 60 inches; white (10YR 8/2) fine sand, light gray (10YR 7/2) moist; few fine distinct brown (7.5YR 5/4) mottles; single grained; loose; slight effervescence; moderately alkaline.

The thickness of the solum ranges from 10 to 16 inches. The A horizon typically has carbonates, but depth to carbonates ranges from 0 to about 38 inches.

The A horizon has color value of 3 to 5 (2 or 3 moist) and chroma of 1 or 2. It is typically loamy fine sand and fine sandy loam, but the range includes very fine sandy loam. Reaction is neutral to mildly alkaline. The AC horizon has color value of 4 or 5 (2 or 3 moist) and chroma of 1 or 2. It is loamy fine sand, fine sandy loam, or fine sand. Reaction is neutral to moderately alkaline. The C horizon has color value of 6 to 8 (5 to 7 moist) and chroma of 2 or 3. It is typically fine sand, but the range includes loamy fine sand. It is typically stratified with lighter and darker colored material ranging in texture from silt loam to fine sand. Reaction ranges from neutral to moderately alkaline.

Cass series

The Cass series consists of deep, well drained, moderately rapidly permeable soils on bottom lands. They formed in mixed loamy and sandy alluvium. Slope ranges from 0 to 2 percent.

Cass soils are commonly adjacent to Anselmo, Cozad, Hord, Inavale, and Ord soils. Anselmo soils are in higher positions. Cozad and Hord soils have more clay and less sand throughout the profile and are also in higher positions. Inavale soils have more sand throughout the profile and do not have a mollic epipedon. Ord soils are in lower positions and are somewhat poorly drained.

Typical pedon of Cass fine sandy loam, 0 to 2 percent slopes, 990 feet west and 660 feet north of the southeast corner of sec. 11, T. 14 N., R. 17 W.:

Ap—0 to 8 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable; neutral; abrupt smooth boundary.
A12—8 to 15 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; soft, very friable; neutral; clear smooth boundary.
AC—15 to 19 inches; light brownish gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; soft, very friable; neutral; gradual smooth boundary.
C1—19 to 35 inches; light gray (10YR 7/2) fine sandy loam, grayish brown (10YR 5/2) moist; massive; soft, very friable; neutral; abrupt smooth boundary.
C2—35 to 60 inches; light gray (10YR 7/2) fine sand with thin strata of loamy fine sand, grayish brown (10YR 5/2) moist; single grained; mildly alkaline.

The thickness of the solum ranges from 10 to 26 inches. Thickness of the mollic epipedon ranges from 10 to 16 inches.

The A horizon has color value of 4 or 5 (2 or 3 moist) and chroma of 1 or 2. It is dominantly fine sandy loam,

but the range includes loam and very fine sandy loam. Reaction is slightly acid or neutral. The C horizon has color value of 6 or 7 (4 or 5 moist) and chroma of 2 or 3. It is generally fine sandy loam, but the range includes loamy fine sand and fine sand in the lower part. Reaction is slightly acid to moderately alkaline. Thin strata of finer or coarser textured material are common.

Coly series

The Coly series consists of deep, moderately permeable soils on the sides and narrow tops of ridges on dissected uplands. They are well drained to excessively drained and formed in silty, calcareous loess. Slope ranges from 6 to 60 percent.

Coly soils are commonly adjacent to Hobbs, Holdrege, and Uly soils. Hobbs soils are on bottom lands below Coly soils and are stratified. Holdrege soils have an argillic horizon and a mollic epipedon. Uly soils have a mollic epipedon and are generally less sloping.

Typical pedon of Coly silt loam (fig. 16) from an area of Coly-Uly silt loams, 11 to 20 percent slopes, eroded, 320 feet south and 2,370 feet west of the northeast corner of sec. 13, T. 13 N., R. 19 W.:

Ap—0 to 4 inches; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure parting to weak fine granular; slightly hard, friable; slight effervescence; moderately alkaline; abrupt smooth boundary.

C—4 to 60 inches; very pale brown (10YR 7/3) silt loam, pale brown (10YR 6/3) moist; massive; slightly hard, friable; violent effervescence; moderately alkaline.

The solum is mildly alkaline or moderately alkaline. Typically, the soil has carbonates at the surface, but depth to carbonates ranges from 0 to 10 inches.

The A horizon has color value of 5 to 7 (3 to 5 moist) and chroma of 2 or 3. It is dominantly silt loam, but the range includes loam and very fine sandy loam. The AC horizon, where present, and C horizon have color value of 5 to 7 (4 to 6 moist) and chroma of 2 or 3. They are dominantly silt loam, but the range includes very fine sand loam in the lower part of the C horizon. The C horizon of most pedons has visible accumulations of carbonates.

Cozad series

The Cozad series consists of deep, well drained, moderately permeable soils on stream terraces, on foot slopes, and in valleys. They formed in alluvium and colluvium. Slope ranges from 0 to 6 percent.

Cozad soils are similar to Hord soils and are commonly adjacent to Anselmo, Hersh, and Hord soils. In Hord soils the mollic epipedon is more than 20 inches thick. Anselmo and Hersh soils have more sand in the

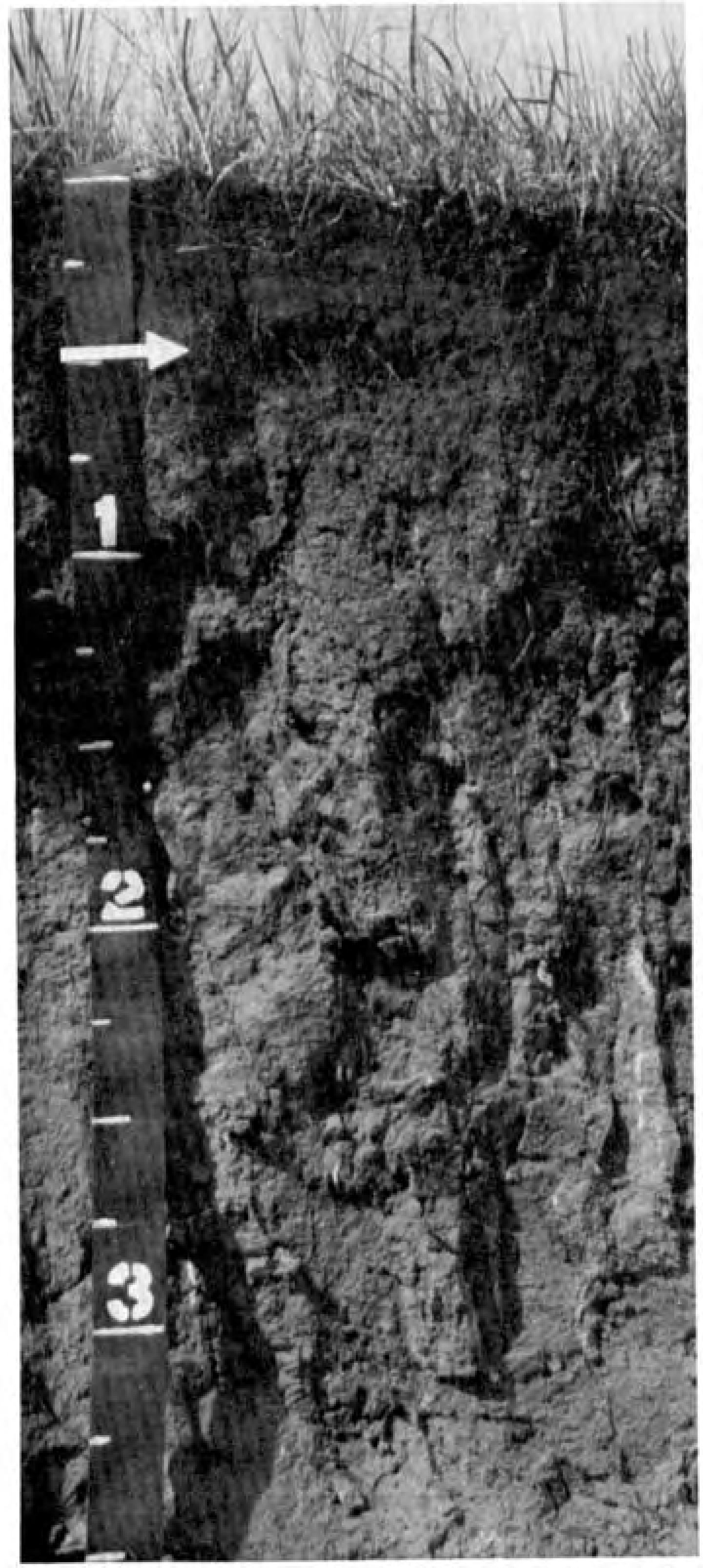

Figure 16.—Profile of Coly silt loam. The surface layer is about 10 inches thick. Depth in feet.

control section. Hersh soils do not have a mollic epipedon.

Typical pedon of Cozad silt loam, terrace, 0 to 1 percent slopes, 200 feet east and 2,350 feet north of the southwest corner of sec. 4, T. 16 N., R. 17 W.:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, friable; neutral; abrupt smooth boundary.

A12—8 to 12 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; slightly hard, friable; neutral; clear smooth boundary.

B2—12 to 22 inches; grayish brown (10YR 5/2) silt loam, dark grayish brown (10YR 4/2) moist; weak medium prismatic structure parting to moderate medium and fine subangular blocky; slightly hard, friable; neutral; gradual smooth boundary.

C—22 to 60 inches; stratified, light brownish gray (10YR 6/2) very fine sandy loam, grayish brown (10YR 5/2) moist; massive; slightly hard, very friable; very slight effervescence; mildly alkaline.

The thickness of the solum ranges from 15 to 25 inches. Thickness of the mollic epipedon ranges from 7 to 18 inches. Carbonates are below a depth of 15 inches. Thickness of the mollic epipedon ranges from 7 to 18 inches.

The A horizon has color value of 3 to 5 (2 or 3 moist) and chroma of 1 or 2. It is dominantly silt loam, but the range includes loam and very fine sandy loam. Reaction is slightly acid or neutral. The B horizon has color value of 5 or 6 (4 or 5 moist) and chroma of 2. It is silt loam or very fine sandy loam having 14 to 18 percent clay (average of about 16 percent). Reaction is slightly acid to moderately alkaline. The C horizon has color value of 6 or 7 (5 or 6 moist) and chroma of 2 or 3. It is very fine sandy loam, but the range includes silt loam. Reaction is neutral or moderately alkaline. Buried soils and stratification are common in the C horizon.

Dunday series

The Dunday series consists of deep, well drained, rapidly permeable soils on stream terraces. They formed in eolian sand. Slope ranges from 0 to 3 percent.

Dunday soils are commonly adjacent to Anselmo, Cozad, Hersh, and Valentine soils. Anselmo and Hersh soils have less sand in the control section. Hersh and Valentine soils do not have a mollic epipedon. Valentine soils are excessively drained. Cozad soils have less sand throughout the profile.

Typical pedon of Dunday loamy fine sand, 0 to 3 percent slopes, 80 feet west and 1,850 feet south of the center of sec. 18, T. 16 N., R. 23 W.:

A1—0 to 12 inches; dark grayish brown (10YR 4/2) loamy fine sand, very dark grayish brown (10YR 3/2) moist; weak very fine granular structure; soft, very friable; neutral; clear wavy boundary.

AC—12 to 19 inches; pale brown (10YR 6/3) loamy fine sand, dark brown (10YR 4/3) moist; weak medium subangular blocky structure; soft, very friable; neutral; gradual wavy boundary.

C1—19 to 26 inches; very pale brown (10YR 7/3) fine sand, pale brown (10YR 6/3) moist; single grained; loose; neutral; clear wavy boundary.

C2—26 to 60 inches; light gray (10YR 7/2) fine sand, light brownish gray (10YR 6/2) moist; single grained; loose; neutral.

The thickness of the solum ranges from 14 to 28 inches. The mollic epipedon ranges from 10 to 14 inches in thickness.

The A horizon has color value of 4 or 5 (2 or 3 moist) and chroma of 1 or 2. Reaction is slightly acid or neutral. The AC horizon has color value of 5 or 6 (3 or 4 moist) and chroma of 2 or 3. It is loamy fine sand, but the range includes fine sand. The C horizon has color value of 5 to 7 (5 or 6 moist) and chroma of 2 or 3. It is a fine sand, but the range includes loamy fine sand. Reaction is slightly acid to mildly alkaline.

Els series

The Els series consists of deep, somewhat poorly drained, rapidly permeable soils in sandhill valleys. They formed in eolian sand. Slope ranges from 0 to 3 percent.

Els soils are adjacent to Valentine soils. Valentine soils are in higher positions and are excessively drained.

Typical pedon of Els fine sand, 0 to 3 percent slopes, 1,050 feet west and 1,580 feet north of the southeast corner of sec. 5, T. 20 N., R. 24 W.:

A1—0 to 6 inches; dark grayish brown (10YR 4/2) fine sand, very dark gray (10YR 3/1) moist; weak fine granular structure; loose; neutral; clear smooth boundary.

AC—6 to 9 inches; grayish brown (10YR 5/2) fine sand, very dark grayish brown (10YR 3/2) moist; single grained; loose; mildly alkaline; clear smooth boundary.

C1—9 to 20 inches; light brownish gray (10YR 6/2) fine sand, grayish brown (10YR 5/2) moist; single grained; loose; mildly alkaline; clear smooth boundary.

C2—20 to 60 inches; light gray (10YR 7/2) fine sand, light brownish gray (10YR 6/2) moist; many medium distinct dark brown (7.5YR 4/4) mottles; single grained; loose; mildly alkaline.

The thickness of the solum ranges from 8 to 14 inches.

The A horizon has value of 4 or 5 (3 or 4 moist) and chroma of 1 or 2. It is fine sand or loamy fine sand. The AC horizon has value of 4 or 5 (3 or 4 moist) and chroma of 1 or 2. The C horizon has hue of 2.5Y, 10YR, or 5Y; value of 6 to 8 (5 to 7 moist); and chroma of 2 to 4. It is fine sand but contains thin strata of loamy fine sand and fine sandy loam. Mottles in the C horizon range from few fine to many medium and from faint to prominent; they are brown, yellowish brown, and strong brown. Reaction is slightly acid or neutral throughout the profile.

Fillmore Variant

The Fillmore Variant consists of deep, poorly drained, very slowly permeable soils in depressions on uplands. They formed in alluvium and colluvium deposited over loess. Slope ranges from 0 to 1 percent.

Fillmore Variant soils are adjacent to Hall, Holdrege, and Hord soils. Those soils are well drained and are in higher positions.

Typical pedon of Fillmore Variant silt loam, 0 to 1 percent slopes, 1,000 feet east and 100 feet south of the northwest corner of sec. 7, T. 17 N., R. 23 W.:

Ap—0 to 7 inches; grayish brown (10YR 5/2) silt loam, very dark gray (10YR 3/1) moist; weak fine granular structure; slightly hard, friable; slightly acid; abrupt smooth boundary.

C—7 to 42 inches; light brownish gray (10YR 6/2) stratified silt loam and silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; slightly hard, friable; slightly acid; abrupt smooth boundary.

A1b—42 to 54 inches; dark gray (10YR 4/1) silt loam, black (10YR 2/1) moist; weak coarse prismatic structure parting to moderate fine granular; soft, very friable; neutral; abrupt smooth boundary.

A2b—54 to 57 inches; light gray (10YR 7/1) silt loam, dark grayish brown (10YR 4/2) moist; moderate thin platy structure; soft, friable; neutral; abrupt smooth boundary.

B2tb—57 to 60 inches; dark grayish brown (10YR 4/2) silty clay, very dark grayish brown (10YR 3/2) moist; strong fine prismatic structure parting to strong fine blocky; very hard, very firm; mildly alkaline.

Depth to the buried silty clay ranges from 36 to 60 inches.

The A1 horizon has hue of 10YR, value of 4 or 5 (2 or 3 moist) and chroma of 1 or 2. The A2 horizon has hue of 10YR, value of 5 to 7 (3 to 5 moist), and chroma of 1 or 2. The B2 horizon has hue of 10YR, value of 3 to 5 (2 or 3 moist), and chroma of 1 or 2. Reaction is slightly acid to mildly alkaline throughout the profile.

Gannett series

The Gannett series consists of deep, poorly drained and very poorly drained soils on stream terraces and bottom lands. Permeability is moderately rapid in the solum and rapid in the underlying material. Gannett soils formed in alluvium. Slope ranges from 0 to 2 percent.

Gannett soils are commonly adjacent to Boel, Loup, Ovina, and Barney Variant soils. Boel and Ovina soils are somewhat poorly drained. Loup soils have more sand in the control section. Barney Variant soils are very poorly drained and are ponded during most of the year.

Typical pedon of Gannett loam, 0 to 1 percent slopes, 700 feet south and 1,580 feet east of the northwest corner of sec. 3, T. 15 N., R. 23 W.:

A11—0 to 14 inches; dark grayish brown (10YR 4/2) loam, black (10YR 2/1) moist; weak fine granular structure; soft, very friable; strong effervescence; mildly alkaline; clear smooth boundary.

A12—14 to 20 inches; dark gray (10YR 4/1) loam, black (10YR 2/1) moist; moderate fine granular structure; soft, very friable; mildly alkaline; abrupt smooth boundary.

AC—20 to 25 inches; light gray (10YR 7/1) fine sandy loam, dark grayish brown (10YR 4/2) moist; massive; hard, friable; mildly alkaline; clear smooth boundary.

C—25 to 60 inches; stratified light gray (10YR 7/2) fine sand, light brownish gray (10YR 6/2) moist; few medium distinct brown (7.5YR 5/4) mottles; single grained; loose; mildly alkaline.

The thickness of the solum ranges from 15 to 27 inches.

The A horizon has color value of 3 or 4 (2 or 3 moist) and chroma of 1 or 2. It is dominantly loam, but the range includes silt loam and very fine sandy loam. Some pedons lack the AC horizon. The C horizon is gray or light gray fine sand, but in places it contains thin strata of loamy fine sand and very fine sandy loam. The C horizon has prominent or distinct brown to yellowish brown mottles. Reaction is mildly alkaline or moderately alkaline throughout the profile.

Gates series

The Gates series consists of deep, well drained to excessively drained, moderately permeable soils on uplands and in valleys. They formed in recent loess. Slope ranges from 3 to 60 percent.

Gates soils are commonly adjacent to Hersh, Kenesaw, and Valentine soils. Hersh and Valentine soils have more sand in the control section. Kenesaw soils have a mollic epipedon.

Typical pedon of Gates very fine sandy loam, 6 to 11 percent slopes, 200 feet north and 2,440 feet west of the southeast corner of sec. 6, T. 18 N., R. 22 W.:

Ap—0 to 5 inches; light gray (10YR 7/2) very fine sandy loam, grayish brown (10YR 5/2) moist; weak coarse prismatic structure; slightly hard, friable; moderately alkaline; abrupt smooth boundary.

AC—5 to 18 inches; very pale brown (10YR 7/3) very fine sandy loam, light brownish gray (10YR 6/2) moist; weak coarse prismatic structure; slightly hard, friable; moderately alkaline; clear smooth boundary.

C1—18 to 60 inches; light gray (2.5Y 7/2) very fine sandy loam, grayish brown (2.5Y 5/2) moist; weak coarse prismatic structure; slightly hard, friable; slight effervescence; moderately alkaline.

The thickness of the solum ranges from 10 to 22 inches. Depth to carbonates is typically more than 15 inches but ranges from 6 to 22 inches.

The A horizon has color value of 5 to 7 (4 to 6 moist) and chroma of 1 to 3. It is dominantly very fine sandy loam, but the range includes fine sandy loam. The AC and C horizons have hue of 10YR or 2.5Y, value of 5 to 7 (4 to 6 moist), and chroma of 2 or 3. Accumulations of carbonates are generally visible in the C horizon.

Gibbon series

The Gibbon series consists of deep, somewhat poorly drained, moderately permeable soils on bottom lands. They formed in alluvium. Slope ranges from 0 to 1 percent.

Gibbon soils are commonly adjacent to Boel, Gannett, Inavale, Loup, and Ord soils. Boel, Inavale, and Loup soils have more sand in the control section. Gannett and Ord soils have less clay in the control section. Gannett soils are poorly drained or very poorly drained.

Typical pedon of Gibbon silt loam, 0 to 1 percent slopes, 60 feet east and 1,420 feet north of the center of sec. 1, T. 13 N., R. 20 W.:

Ap—0 to 5 inches; very dark grayish brown (10YR 3/2) silt loam, very dark brown (10YR 2/2) moist; weak fine granular structure; slightly hard, friable; slight effervescence; mildly alkaline; abrupt smooth boundary.

A12—5 to 10 inches; very dark grayish brown (10YR 3/2) silt loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure parting to weak fine granular structure; slightly hard, friable; strong effervescence; mildly alkaline; clear wavy boundary.

C1—10 to 19 inches; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; few fine faint yellowish brown (10YR 5/4) mottles; massive; slightly hard, friable; strong effervescence; mildly alkaline; clear smooth boundary.

Ab—19 to 33 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; few fine faint yellowish brown (10YR 5/4) mottles; weak fine subangular blocky structure; slightly hard, friable; slight effervescence; mildly alkaline; gradual wavy boundary.

C2—33 to 60 inches; light brownish gray (10YR 6/2) very fine sandy loam, dark grayish brown (10YR 4/2) moist; content of very fine sand increases with depth; many fine faint strong yellowish brown (10YR 5/6) mottles; massive; slightly hard, friable; slight effervescence; mildly alkaline.

The thickness of the solum and of the mollic epipedon ranges from 10 to 20 inches. The soil is calcareous at or near the surface.

The A horizon has value of 3 to 5 (2 or 3 moist) and chroma of 1 or 2. It is silt loam, very fine sandy loam, or loam. Reaction is mildly alkaline or moderately alkaline. The C horizon has hue of 10YR or 2.5Y, value of 5 to 7 (4 to 6 moist), and chroma of 1 or 2. It is silt loam or loam containing more than 18 percent clay. Mottles are above a depth of 40 inches and are few fine to many medium and faint or distinct; they are brown, yellowish brown or strong brown. Reaction is mildly alkaline to strongly alkaline. A buried soil is common below a depth of 18 inches.

Graybert series

The Graybert series consists of deep, well drained, moderately permeable soils in valleys. They formed in recent loess over buried soils that were also formed in loess. Slope ranges from 0 to 6 percent.

Graybert soils are similar to Gates and Kenesaw soils and are commonly adjacent to Gates, Hord, and Kenesaw soils. Gates and Kenesaw soils do not have a buried soil. Hord soils have more clay in the control section and have a thicker dark surface layer.

Typical pedon of Graybert very fine sandy loam, 0 to 1 percent slopes, 100 feet south and 792 feet west of the northeast corner of sec. 26, T. 18 N., R. 22 W.:

Ap—0 to 8 inches; grayish brown (10YR 5/2) very fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable; neutral; abrupt smooth boundary.

A12—8 to 10 inches; dark grayish brown (10YR 4/2) very fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable; neutral; abrupt smooth boundary.

B2—10 to 24 inches; light brownish gray (10YR 6/2) very fine sandy loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; soft, very friable; neutral; abrupt smooth boundary.

A1b—24 to 38 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; weak medium and fine granular structure; slightly hard, friable; mildly alkaline; clear smooth boundary.

B2b—38 to 52 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, friable; lime accumulations within root pores; strong effervescence; moderately alkaline; gradual smooth boundary.

B3b—52 to 58 inches; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; slightly hard, friable; strong effervescence; moderately alkaline; clear smooth boundary.

C—58 to 60 inches; light gray (10YR 7/1) silt loam, light brownish gray (10YR 6/2) moist; massive; slightly hard, friable; strong effervescence; moderately alkaline.

The thickness of the solum of the recent soil ranges from 16 to 30 inches. The mantle of recent loess over the buried soil ranges from 20 to 40 inches in thickness.

The A horizon has hue of 10YR, value of 4 or 5 (2 or 3 moist), and chroma of 1 or 2. It is very fine sandy loam, silt loam, or loam. The B horizon has hue of 10YR, value of 5 or 6 (4 or 5 moist), and chroma of 1 or 2. Reaction is neutral or mildly alkaline. It is very fine sandy loam, loam, or silt loam. The Alb horizon is at a depth of 20 to 40 inches. It has hue of 10YR, value of 4 or 5 (2 or 3 moist), and chroma of 1 or 2. The B2b horizon has hue of 10YR, value of 4 or 5 (3 or 4 moist), and chroma of 1 or 2. The C horizon has hue of 10YR or 2.5Y, value of 6 or 7 (5 or 6 moist), and chroma of 1 or 2.

Hall series

The Hall series consists of deep, well drained, moderately permeable soils on uplands and in valleys. They formed in loess. Slope ranges from 0 to 3 percent.

Hall soils are similar to Holdrege soils and are commonly adjacent to Holdrege and Hord soils. In Holdrege soils the mollic epipedon is less than 20 inches thick. Hord soils do not have an argillic horizon.

Typical pedon of Hall silt loam, 1 to 3 percent slopes, 100 feet west and 1,580 feet north of the southeast corner of sec. 23, T. 16 N., R. 23 W.:

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; weak medium and fine granular structure; slightly hard, friable; neutral; abrupt smooth boundary.

A12—7 to 17 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; weak medium and fine granular structure; slightly hard, friable; neutral; clear smooth boundary.

B2t—17 to 28 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate coarse and medium subangular blocky structure; hard, firm; few shiny faces on peds; neutral; gradual wavy boundary.

B3—28 to 36 inches; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; weak coarse and medium subangular blocky structure; hard, friable; mildly alkaline; gradual wavy boundary.

C1—36 to 45 inches; very pale brown (10YR 7/3) silt loam, brown (10YR 5/3) moist; weak coarse prismatic structure; slightly hard, friable; mildly alkaline; clear smooth boundary.

C2—45 to 60 inches; light gray (10YR 7/2) silt loam, light brownish gray (10YR 6/2) moist; weak coarse prismatic structure; slightly hard, friable; violent effervescence; moderately alkaline.

The thickness of the solum ranges from 30 to 54 inches. Thickness of the mollic epipedon ranges from 20 to 32 inches. Typically, the solum lacks carbonates, but carbonates are in the C horizon.

The A horizon has color value of 3 to 5 (2 or 3 moist) and chroma of 1 or 2. The B2t horizon has color value of 3 to 5 (3 or 4 moist) and chroma of 1 or 2. Reaction is neutral or slightly acid in the upper part of the solum and neutral or mildly alkaline in the lower part. The C horizon has color value of 6 or 7 (5 or 6 moist) and chroma of 2 or 3.

Hersh series

Hersh soils consist of deep, well drained and somewhat excessively drained, moderately rapidly permeable soils on uplands and in valleys. They formed in mixed eolian sand and loamy material. Slope ranges from 0 to 30 percent.

Hersh soils are similar to Anselmo soils and are commonly adjacent to Anselmo, Cozad, Gates, Kenesaw, and Valentine soils. Anselmo, Cozad, and Kenesaw soils have a mollic epipedon. Cozad, Kenesaw, and Gates soils have less sand in the control section. Valentine soils have more sand in the control section.

Typical pedon of Hersh fine sandy loam, 3 to 6 percent slopes, 50 feet north and 300 feet east of the southwest corner of sec. 6, T. 18 N., R. 22 W.:

Ap—0 to 5 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable; neutral; abrupt smooth boundary.

AC—5 to 10 inches; grayish brown (10YR 5/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak coarse prismatic structure; soft, very friable; neutral; clear smooth boundary.

C—10 to 60 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 5/3) moist; massive; soft, very friable; mildly alkaline.

The thickness of the solum ranges from 8 to 20 inches. Carbonates typically are below a depth of 40 inches but are above a depth of 30 inches in some pedons.

The A horizon has color value of 4 to 6 (3 or 4 moist) and chroma of 2 or 3. It is typically fine sandy loam, but the range includes very fine sandy loam or loamy fine sand. Reaction is slightly acid or neutral. The AC horizon has color value of 5 or 6 (4 or 5 moist) and chroma of 2 or 3. Reaction is slightly acid or neutral. The C horizon has color value of 5 to 7 (4 to 6 moist) and chroma of 2 or 3. It is fine sandy loam, but the range includes loamy fine sand and fine sand in the lower part of the C horizon. Reaction is neutral or mildly alkaline. Some pedons are stratified with finer or coarser textured material below a depth of 40 inches.

Hobbs series

The Hobbs series consists of deep, well drained, moderately permeable soils on bottom lands along streams and upland drainageways. They formed in stratified alluvium. Slope ranges from 0 to 2 percent.

Hobbs soils are adjacent to Coly, Cozad, Holdrege, Hord, and Uly soils. Coly and Uly soils are steeper and are above Hobbs soils. Coly soils are not stratified. Cozad, Hord, and Uly soils have a mollic epipedon and a weakly developed B horizon. Hord soils have a thicker dark surface layer. Holdrege soils have an argillic horizon and are in higher positions.

Typical pedon of Hobbs silt loam, 0 to 2 percent slopes (fig. 17), 110 feet north and 100 feet east of the southwest corner of sec. 24, T. 13 N., R. 17 W.:

Ap—0 to 6 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak medium granular structure; slightly hard, friable; neutral; abrupt smooth boundary.

C1—6 to 30 inches; stratified grayish brown (10YR 5/2) and dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium granular structure; slightly hard, friable; mildly alkaline; clear smooth boundary.

C2—30 to 60 inches; stratified pale brown (10YR 6/3) and brown (10YR 5/3) silt loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, friable; mildly alkaline.

Typically, the upper 40 inches of the profile lacks carbonates, but some pedons have thin recently deposited layers that contain free carbonates.

The A horizon has color value of 4 or 5 (2 or 3 moist) and chroma of 1 or 2. It is typically silt loam, but the range includes fine sandy loam. Reaction ranges from slightly acid to mildly alkaline. The C horizon typically has hue of 10YR or 2.5Y, value of 4 to 7 (3 to 6 moist), and chroma of 1 to 3. Some pedons have thin strata of higher or lower color value. The C horizon is typically silt loam but has thin strata of sandy or more clayey material in some pedons. The C horizon ranges from slightly acid to moderately alkaline. A buried A horizon is common.

Holdrege series

The Holdrege series consists of deep, well drained, moderately permeable soils on uplands. They formed in loess. Slope ranges from 1 to 11 percent.

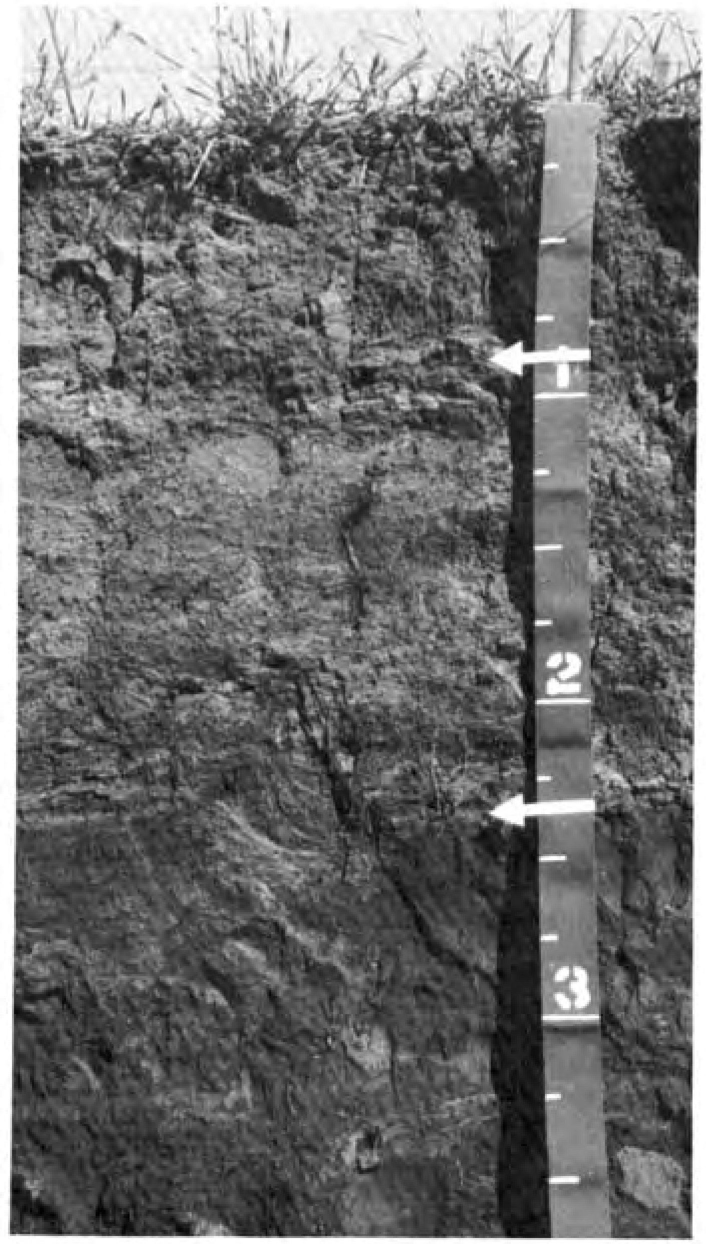

Figure 17.—Profile of Hobbs silt loam, 0 to 2 percent slopes, a deep, weakly developed soil that formed in recently deposited, stratified alluvium. Markers separate distinct layers of stratified material. Depth in feet.

Holdrege soils are similar to Hall soils and are commonly adjacent to Hall, Hobbs, Hord, and Uly soils. In Hall and Hord soils the mollic epipedon is more than 20 inches thick. Hobbs soils are stratified and are in lower positions. Hobbs, Uly, and Hord soils do not have an argillic horizon.

Typical pedon (fig. 18) of Holdrege silt loam, 6 to 11 percent slopes, 140 feet north and 1,056 feet west of the southeast corner of sec. 24, T. 13 N., R. 18 W.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, friable; slightly acid; abrupt smooth boundary.

A12—6 to 10 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate medium and fine granular structure; slightly hard, friable; neutral; clear wavy boundary.

B21t—10 to 19 inches; dark grayish brown (10YR 4/2) silty clay loam, dark brown (10YR 3/3) moist; strong medium subangular blocky structure; hard, firm; shiny surfaces on peds; neutral; abrupt smooth boundary.

B22t—19 to 26 inches; brown (10YR 5/3) silty clay loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; hard, firm; shiny surfaces on peds; neutral; gradual wavy boundary.

B3—26 to 32 inches; very pale brown (10YR 7/3) silt loam, pale brown (10YR 6/3) moist; moderate medium subangular blocky structure; slightly hard, friable; neutral; gradual wavy boundary.

C—32 to 60 inches; light gray (10YR 7/2) silt loam, pale brown (10YR 6/3) moist; massive; slightly hard, friable; violent effervescence; moderately alkaline.

The thickness of the solum and the depth to free carbonates ranges from 20 to 36 inches. Thickness of the mollic epipedon ranges from 8 to 20 inches.

The A horizon has hue of 10YR, value of 4 or 5 (2 or 3 moist), and chroma of 2 or 3. It is typically silt loam, but the range includes very fine sandy loam and loam. Reaction is neutral or slightly acid. The B2t horizon has hue of 10YR, value of 4 to 7 (3 to 5 moist), and chroma of 2 to 4. It is typically silty clay loam containing 28 to 35 percent clay. The Bt horizon is neutral or mildly alkaline. The B3 horizon has hue of 10YR, value of 5 to 7 (4 to 6 moist), and chroma of 2 or 3. It is silt loam or silty clay loam. The C horizon has hue of 10YR, value of 6 or 7 (5 or 6 moist), and chroma of 2 to 4. The reaction of the C horizon is mildly alkaline or moderately alkaline.

In the map units HoC2 and HoD2, the surface layer is thinner than is defined in the range for the series, but this difference does not alter the use or management of the soil.

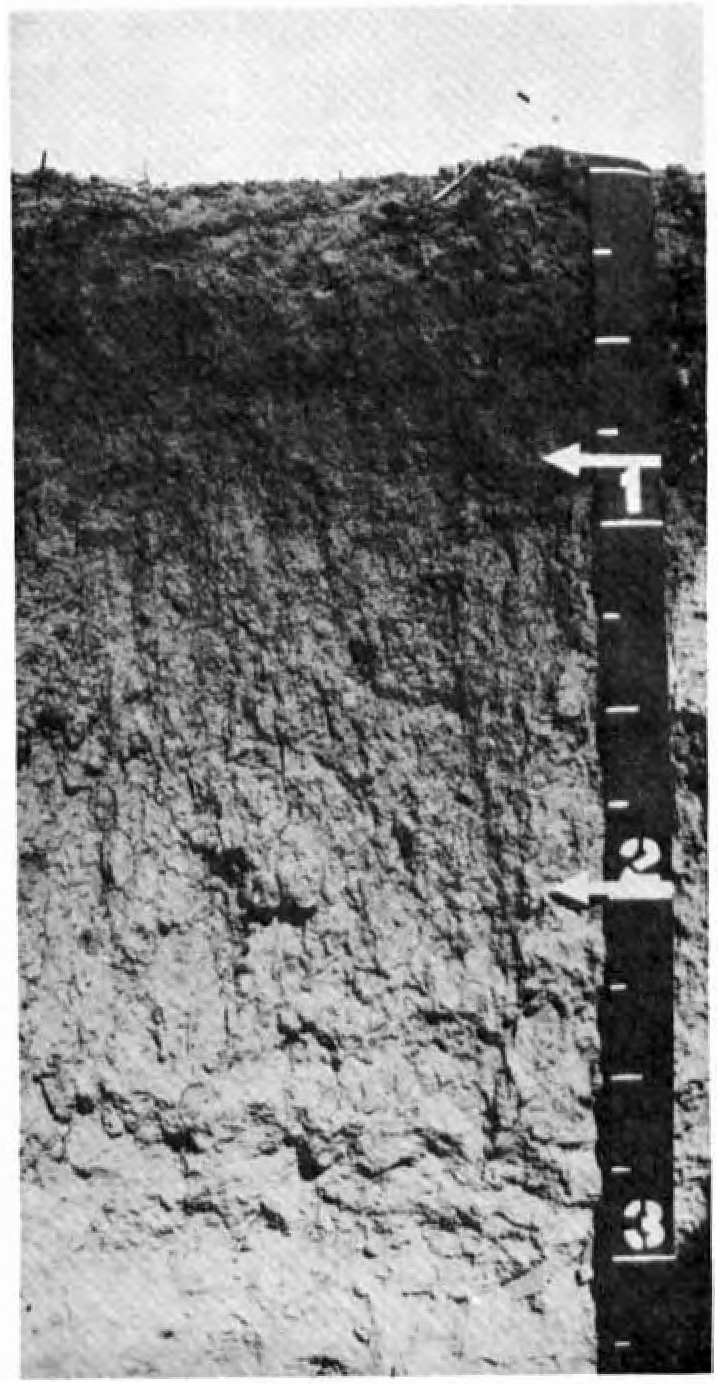

Figure 18.—Profile of Holdrege silt loam, 3 to 6 percent slopes. The upper part of the subsoil is between depths of about 10 inches and 24 inches. Depth in feet.

Hord series

The Hord series consists of deep, well drained, moderately permeable soils. They formed in loess on uplands, in valleys, and on foot slopes and in alluvium on stream terraces. Slope ranges from 0 to 6 percent.

Hord soils are commonly adjacent to Cozad, Hall, Hobbs, Holdrege, and Kenesaw soils. Cozad and

Kenesaw soils have a thinner surface layer. Hall and Holdrege soils have an argillic horizon. Hobbs soils are stratified.

Typical pedon of Hord silt loam, terrace, 0 to 1 percent slopes, 2,640 feet south and 2,540 feet east of the northwest corner of sec. 25, T. 15 N., R. 18 W.:

A1—0 to 17 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; weak fine granular structure; slightly hard, friable; slightly acid; gradual wavy boundary.

B2—17 to 28 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak coarse and medium subangular blocky structure; slightly hard, friable; slightly acid; gradual wavy boundary.

B3—28 to 45 inches; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; weak coarse and medium subangular blocky structure; slightly hard, friable; neutral; gradual wavy boundary.

C—45 to 60 inches; very pale brown (10YR 7/3) silt loam, brown (10YR 5/3) moist; massive; soft, very friable; strong effervesence; moderately alkaline; gradual smooth boundary.

The thickness of the solum ranges from 30 to 55 inches. The thickness of the mollic epipedon ranges from 20 to 40 inches. Depth to free carbonates ranges from 20 to 48 inches.

The A horizon has hue of 10YR, value of 4 or 5 (2 or 3 moist), and chroma of 1 or 2. It is typically silt loam, but the range includes loam, very fine sandy loam, and fine sandy loam. Reaction is slightly acid or neutral. The B2 horizon has hue of 10YR, value of 4 to 6 (2 to 5 moist), and chroma of 2 or 3. It is typically silt loam, but the range includes loam or silty clay loam. It ranges from neutral to mildly alkaline. The C horizon has hue of 10YR, value of 5 to 7 (4 to 6 moist), and chroma of 2 or 3. It is typically silt loam, but the range includes very fine sandy loam. Reaction is mildly alkaline or moderately alkaline. Some pedons have a buried A horizon.

Inavale series

The Inavale series consists of deep, somewhat excessively drained, rapidly permeable soils on bottom lands. They formed in sandy alluvium. Slope ranges from 0 to 3 percent.

Inavale soils are adjacent to Anselmo, Barney, Boel, and Ord soils. Anselmo and Ord soils have less sand in the control section. Anselmo, Boel, and Ord soils have a mollic epipedon. Barney soils are poorly drained. Ord soils are somewhat poorly drained.

Typical pedon of Inavale loamy fine sand, 0 to 3 percent slopes, 1,600 feet west and 450 feet north of the southeast corner of sec. 14, T. 15 N., R. 22 W.:

A1—0 to 6 inches; light brownish gray (10YR 6/2) loamy fine sand, dark grayish brown (10YR 4/2) moist; weak coarse granular structure; loose; neutral; clear smooth boundary.

AC—6 to 10 inches; very pale brown (10YR 7/3) fine sand, grayish brown (10YR 5/2) moist; single grained; loose; neutral; clear smooth boundary.

C1—10 to 24 inches; light gray (10YR 7/2) fine sand stratified with thin layers of loamy fine sand, light brownish gray (10YR 6/2) moist; single grained; loose; mildly alkaline; gradual smooth boundary.

C2—24 to 60 inches; light gray (10YR 7/2) fine sand stratified with thin layers of loamy fine sand, grayish brown (10YR 5/2) moist; single grained; loose; mildly alkaline.

The thickness of the solum ranges from 10 to 14 inches.

The A horizon has hue of 10YR, value of 4 to 7 (4 or 5 moist), and chroma of 2 or 3. It is commonly loamy fine sand, but the range includes fine sand and fine sandy loam. Reaction is neutral or mildly alkaline. The AC and C horizons have hue of 10YR, value of 5 to 7 (4 to 6 moist), and chroma of 2 or 3. They are fine sand, but the range includes loamy fine sand. They are stratified in some places. Reaction is typically neutral or mildly alkaline but ranges to moderately alkaline.

Ipage series

The Ipage series consists of deep, moderately well drained, rapidly permeable sandy soils on stream terraces. They formed in eolian and alluvial sand. Slope ranges from 0 to 3 percent.

Ipage soils are commonly adjacent to Boel, Cozad, Hersh, and Valentine soils. Boel soils are in lower positions on bottom lands and are somewhat poorly drained. Cozad soils have less sand in the control section and have a mollic epipedon. Hersh and Valentine soils are in undulating areas above Ipage soils and are well drained and excessively drained.

Typical pedon of Ipage loamy fine sand, 0 to 3 percent slopes, 1,600 feet south and 300 feet west of the northeast corner of sec. 2, T. 19 N., R. 20 W.:

A1—0 to 7 inches; grayish brown (10YR 5/2) loamy fine sand, very dark grayish brown (10YR 3/2) moist; weak medium and fine granular structure; loose; neutral; clear smooth boundary.

AC—7 to 12 inches; grayish brown (10YR 5/2) loamy fine sand, dark grayish brown (10YR 4/2) moist; single grained; loose; neutral; gradual smooth boundary.

C—12 to 60 inches; light gray (10YR 7/2) fine sand, light brownish gray (10YR 6/2) moist; few fine distinct strong brown (7.5YR 5/6) mottles below a depth of 30 inches; single grained; loose; neutral.

The thickness of the solum ranges from 5 to 16 inches.

The A horizon has color value of 4 to 6 (3 or 4 moist) and chroma of 1 or 2. It is typically loamy fine sand, but the range includes fine sand. The AC horizon has color value of 5 or 6 (4 or 5 moist) and chroma of 2 or 3. It is loamy fine sand or fine sand. The C horizon has color value of 6 or 7 (5 or 6 moist) and chroma of 2 or 3. Mottles range from few to common, fine to medium, and distinct and prominent and are gray to strong brown. They are above a depth of 40 inches. Reaction is slightly acid or neutral throughout the profile.

Kenesaw series

The Kenesaw series consists of deep, well drained, moderately permeable soils on uplands and in valleys. They formed in recent loess. Slope ranges from 0 to 3 percent.

Kenesaw soils are similar to Gates and Graybert soils and are commonly adjacent to Anselmo, Gates, Graybert, Hersh, Hord, and Valentine soils. Anselmo, Hersh, and Valentine soils have more sand in the control section. Gates, Graybert, Hersh, and Valentine soils do not have a mollic epipedon. Graybert soils have a buried soil. Hord soils have more clay in the control section and have a mollic epipedon more than 20 inches thick.

Typical pedon of Kenesaw very fine sandy loam, 0 to 1 percent slopes, 100 feet east and 1,584 feet south of the northwest corner of sec. 36, T. 18 N., R. 22 W.:

A1p—0 to 7 inches; grayish brown (10YR 5/2) very fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, friable; neutral; abrupt smooth boundary.

A12—7 to 10 inches; grayish brown (10YR 5/2) very fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, friable; neutral; clear smooth boundary.

B2—10 to 17 inches; light brownish gray (10YR 6/2) very fine sandy loam, dark grayish brown (10YR 4/2) moist; weak coarse subangular blocky structure; slightly hard, friable; neutral; clear smooth boundary.

C1—17 to 34 inches; light gray (10YR 7/2) very fine sandy loam, grayish brown (10YR 5/2) moist; massive; soft, friable; neutral; clear smooth boundary.

C2—34 to 60 inches; light gray (10YR 7/2) very fine sandy loam, grayish brown (10YR 5/2) moist; massive; soft, friable; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 12 to 22 inches. Thickness of the mollic epipedon ranges from 7 to 16 inches. The control section (10 to 40 inches) is less than 18 percent clay. The depth to carbonates ranges from 15 to 36 inches.

The A horizon has color value of 4 or 5 (2 or 3 moist) and chroma of 2. It is dominantly very fine sandy loam, but the range includes silt loam, loam, and fine sandy loam. Reaction is slightly acid or neutral. The B2 horizon has color value of 5 or 6 (4 to 5 moist) and chroma of 2 or 3. It is very fine sandy loam, but the range includes silt loam and loam. Reaction is neutral or mildly alkaline. The C horizon has color value of 6 or 7 (5 or 6 moist) and chroma of 2 or 3. It is dominantly very fine sandy loam, but the range includes silt loam. Reaction is mildly alkaline or moderately alkaline.

Loup series

The Loup series consists of deep, poorly drained, sandy soils on stream terraces and bottom lands. Permeability is moderately rapid in the solum and rapid in the underlying material. Loup soils formed in loamy and sandy alluvial material. Slope ranges from 0 to 2 percent.

Loup soils are commonly adjacent to Barney, Boel and Gannett soils. Barney soils are in slightly lower positions and have a mollic epipedon. Boel soils are somewhat poorly drained and are slightly higher. Gannett soils have less sand in the control section.

Typical pedon of Loup loam from an area of Gannett and Loup loams, 0 to 2 percent slopes, 1,900 feet west and 2,700 feet south of the northeast corner of sec. 13, T. 14 N., R. 21 W.:

A1—0 to 8 inches; grayish brown (10YR 5/2) loam, very dark gray (10YR 3/1) moist; weak medium subangular blocky structure parting to weak fine granular; slightly hard, friable; violent effervescence; moderately alkaline; clear smooth boundary.

AC—8 to 12 inches; light gray (10YR 7/2) very fine sandy loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, friable; violent effervescence; mildly alkaline; clear smooth boundary.

C1—12 to 19 inches; light gray (10YR 7/2) fine sand, light brownish gray (10YR 6/2) moist; common medium distinct brown (7.5YR 5/4) mottles; single grained; loose; mildly alkaline; clear smooth boundary.

C2—19 to 60 inches; white (10YR 8/2) fine sand, light brownish gray (10YR 6/2) moist; common medium distinct brown (7.5YR 5/4) mottles; single grained; loose; mildly alkaline.

The thickness of solum ranges from 10 to 22 inches. The thickness of the mollic epipedon ranges from 7 to 18 inches.

The A horizon has color value of 4 or 5 (2 or 3 moist) and chroma of 1 or 2. It is loam or fine sandy loam. The AC horizon is intermediate between the A horizon and the C horizon. The C horizon has hue of 10YR or 2.5Y, value of 6 to 8 (5 or 6 moist), and chroma of 1 or 2. It has few fine to common medium, faint or distinct,

yellowish brown, brown, or strong brown mottles. Reaction ranges from neutral to moderately alkaline throughout.

Ord series

The Ord series consists of deep, somewhat poorly drained, moderately rapidly permeable soils on bottom lands along major streams. They formed in sandy and loamy alluvium. Slope ranges from 0 to 1 percent.

Ord soils are commonly adjacent to Barney, Boel, Cass, and Inavale soils. Barney soils are poorly drained and are in lower positions. Boel soils have more sand in the control section. Cass and Inavale soils are well drained and somewhat excessively drained and are generally in higher positions.

Typical pedon of Ord very fine sandy loam, 0 to 1 percent slopes, 300 feet north and 1,580 feet east of the southwest corner of sec. 14, T. 15 N., R. 22 W.:

A1—0 to 10 inches; grayish brown (10YR 5/2) very fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable; neutral; clear smooth boundary.

AC—10 to 22 inches; light brownish gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; loose; strong effervescence; mildly alkaline; clear smooth boundary.

C1—22 to 28 inches; light brownish gray (10YR 6/2) fine sandy loam, grayish brown (10YR 5/2) moist; massive; loose; strong effervescence; moderately alkaline; clear smooth boundary.

C2—28 to 60 inches; light gray (10YR 7/2) fine sand stratified with thin layers of loamy fine sand, light brownish gray (10YR 6/2) moist; few medium faint yellowish brown (10YR 5/6) mottles; single grained; loose; moderately alkaline.

The thickness of the solum ranges from 14 to 30 inches. The mollic epipedon ranges from 10 to 15 inches in thickness. Depth to carbonates is 10 to 36 inches.

The A horizon has color value of 3 to 5 (2 or 3 moist) and chroma of 1 or 2. It is typically very fine sandy loam, but includes fine sandy loam or loam. The AC horizon has hue of 2.5Y or 10YR, value of 5 or 6 (4 or 5 moist), and chroma of 2. It is fine sandy loam or very fine sandy loam. The C horizon has hue of 2.5Y or 10YR, value of 5 to 7 (4 to 6 moist), and chroma of 2. Mottles are few or common, fine or medium, faint or distinct grayish brown, brown, strong brown, or yellowish brown. It is commonly stratified fine sand, but the range includes layers of fine sandy loam or loamy fine sand. Reaction ranges from neutral to moderately alkaline throughout.

Ovina series

The Ovina series consists of deep, somewhat poorly drained, moderately rapidly permeable soils on stream terraces. They formed in sandy and loamy alluvium. Slope ranges from 0 to 2 percent.

Ovina soils are commonly adjacent to Anselmo, Dunday, and Gannett soils. Anselmo and Dunday soils are well drained. Dunday soils have more sand in the control section. Gannett soils are very poorly drained and poorly drained and are generally in a lower positions.

Typical pedon of Ovina loam, 0 to 2 percent slopes, 70 feet north and 1,800 feet east of the southwest corner of sec. 3, T. 15 N., R. 23 W.:

Ap—0 to 7 inches; gray (10YR 5/1) loam, very dark gray (10YR 3/1) moist; weak fine granular structure; slightly hard; friable; violent effervescence; mildly alkaline; abrupt smooth boundary.

A12—7 to 15 inches; gray (10YR 5/1) loam, very dark gray (10YR 3/1) moist; weak medium subangular blocky structure parting to weak fine granular; slightly hard, friable; violent effervescence; mildly alkaline; clear smooth boundary.

A13—15 to 19 inches; gray (10YR 6/1) loam, dark gray (10YR 4/1) moist; weak fine subangular blocky structure; slightly hard; friable; violent effervescence; mildly alkaline; clear smooth boundary.

C1—19 to 30 inches; light gray (10YR 7/2) fine sandy loam, grayish brown (10YR 5/2) moist; massive; soft, very friable; violent effervescence; mildly alkaline; clear smooth boundary.

C2—30 to 52 inches; light gray (10YR 7/2) fine sandy loam stratified with thin layers of loam, grayish brown (10YR 5/2) moist; many medium distinct brown (7.5YR 5/4) mottles; massive; soft, very friable; mildly alkaline; clear smooth boundary.

C3—52 to 60 inches; stratified light gray (2.5Y 7/2) fine sandy loam, stratified with thin layers of loam, light brownish gray (2.5Y 6/2) moist; massive; soft, very friable; mildly alkaline.

The thickness of the solum ranges from 10 to 20 inches. Thickness of the mollic epipedon ranges from 7 to 20 inches.

The A horizon has color value of 4 to 6 (2 to 4 moist) and chroma of 1 or 2. It is typically loam, but the range includes fine sandy loam. Reaction is mildly alkaline or moderately alkaline. The C horizon has hue of 10YR in the upper part and hue of 2.5Y in the lower part, value of 5 to 7 (4 to 6 moist), and chroma of 1 or 2. Thin strata of finer textured material occur in the C horizon. The C horizon is mildly alkaline or moderately alkaline.

Rusco series

The Rusco series consists of deep, moderately well drained soils in swales or shallow depressions in valley's and on stream terraces. Permeability is moderately slow. These soils formed in recent loess or alluvium. Slope ranges from 0 to 1 percent.

Rusco soils are commonly adjacent to Cozad, Kenesaw, Hersh, and Gates soils. Cozad and Kenesaw soils have less clay in the control section. Gates and Hersh soils do not have a mollic epipedon. Hersh soils have more sand in the control section.

Typical pedon of Rusco silty clay loam, 0 to 1 percent slopes, 800 feet west and 1,320 feet south of the center of sec. 17, T. 15 N., R. 23 W.:

Ap—0 to 10 inches; dark gray (10YR 4/1) silty clay loam, very dark gray (10YR 3/1) moist; weak medium subangular blocky structure parting to weak fine granular; hard, firm; neutral; clear smooth boundary.

B2t—10 to 22 inches; grayish brown (10YR 5/2) silty clay loam, dark grayish brown (10YR 4/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, firm; mildly alkaline; clear smooth boundary.

B3—22 to 26 inches; pale brown (10YR 6/3) silt loam, brown (10YR 5/3) moist; weak coarse subangular blocky structure parting to weak medium subangular blocky; slightly hard, friable; mildly alkaline; clear smooth boundary.

C1—26 to 40 inches; pale brown (10YR 6/3) silt loam, brown (10YR 5/3) moist; few fine faint grayish brown (10YR 5/2) mottles; massive; slightly hard, friable; neutral; clear smooth boundary.

C2—40 to 60 inches; light brownish gray (10YR 6/2) very fine sandy loam, brown (10YR 5/3) moist; massive; slightly hard, friable; neutral.

The thickness of the solum ranges from 20 to 42 inches. The thickness of the mollic epipedon ranges from 7 to 20 inches. The A horizon has hue of 10YR, value of 4 or 5 (2 or 3 moist), and chroma of 1 or 2. Reaction ranges from slightly acid to mildly alkaline. The B2t and B3 horizons have hue of 10YR, value of 4 to 6 (4 or 5 moist), and chroma of 2 or 3. The C horizon has hue of 10YR or 2.5Y, value of 5 to 7 (4 to 6 moist), and chroma of 1 to 3. The C horizon is silt loam or very fine sandy loam. Reaction of the B and C horizons ranges from neutral to moderately alkaline.

Scott series

The Scott series consist of deep, very poorly drained, very slowly permeable soils in upland depressions. They formed in loess. Slope is less than 1 percent.

Scott soils are commonly adjacent to Hall, Holdrege, and Hord soils. Those soils have less clay in the subsoil and are well drained.

Typical pedon of Scott silty clay loam, 0 to 1 percent slopes, 150 feet south and 1,056 feet east of the center of sec. 25, T. 14 N., R. 18 W.:

A1—0 to 3 inches; dark gray (10YR 4/1) silty clay loam, black (10YR 2/1) moist; weak medium subangular blocky structure parting to weak fine granular; hard, firm; medium acid; abrupt smooth boundary.

A2—3 to 5 inches; light gray (10YR 6/1) silt loam, dark gray (10YR 4/1) moist; weak very fine subangular blocky structure; slightly hard, friable; medium acid; abrupt smooth boundary.

B21t—5 to 31 inches; dark gray (10YR 4/1) silty clay, black (10YR 2/1) moist; strong medium prismatic structure parting to strong medium blocky; very hard, very firm; few small ferromanganese concretions; slightly acid; gradual wavy boundary.

B22t—31 to 40 inches; gray (10YR 5/1) silty clay, very dark gray (10YR 3/1) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; very hard, very firm; neutral; gradual wavy boundary.

B3t—40 to 49 inches; grayish brown (10YR 5/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, firm; mildly alkaline; gradual wavy boundary.

C—49 to 60 inches; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; weak coarse prismatic structure; slightly hard, friable; few thin streaks of carbonates at depths of 49 to 60 inches; mildly alkaline.

The thickness of the solum ranges from 30 to 55 inches. The depth to carbonates ranges from 45 inches to more than 60 inches.

The A1 horizon has color value of 4 to 5 (2 or 3 moist) and chroma of 1 or 2. It is dominantly silty clay loam, but the range includes silt loam. Reaction ranges from medium acid to slightly acid. The A2 horizon has color value of 5 or 6 (3 or 4 moist) and chroma of 1. It is typically silt loam. Reaction is medium or slightly acid. The B2t horizon has color value of 3 to 5 (2 or 3 moist) and chroma of 1 or 2. It is silty clay containing 45 to 55 percent clay. Reaction is neutral to mildly alkaline. The C horizon has color value of 6 or 7 (4 or 5 moist) and chroma of 2 or 3.

Uly series

The Uly series consists of deep, well drained and somewhat excessively drained, moderately permeable soils on uplands. They formed in loess. Slope ranges from 6 to 30 percent.

Uly soils are commonly adjacent to Coly, Hobbs, Holdrege, and Hord soils. Coly soils do not have a mollic epipedon and have carbonates higher in the profile. Hobbs soils are stratified and are on bottom lands below Uly soils. Holdrege soils have an argillic horizon. In Hord soils, the mollic epipedon is more than 20 inches thick.

Typical pedon of Uly silt loam, 11 to 15 percent slopes, 150 feet north and 150 feet west of the southeast corner of sec. 26, T. 15 N., R. 21 W.:

A1—0 to 10 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; weak medium prismatic structure parting to weak fine granular; slightly hard, friable; neutral; clear smooth boundary.

B1—10 to 15 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to weak fine subangular blocky; slightly hard, friable; neutral; clear smooth boundary.

B2—15 to 21 inches; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; weak medium prismatic structure parting to weak medium and fine subangular blocky; hard, friable; neutral; clear smooth boundary.

B3—21 to 25 inches; light gray (10YR 7/2) silt loam, dark grayish brown (10YR 4/2) moist; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, friable; strong effervescence; moderately alkaline; clear smooth boundary.

C—25 to 60 inches; white (10YR 8/2) silt loam, pale brown (10YR 6/3) moist; weak coarse prismatic structure; slightly hard, very friable; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 12 to 30 inches. Thickness of the mollic epipedon ranges from 8 to 18 inches. The depth to free calcium carbonates ranges from 8 to 25 inches.

The A horizon has color value of 3 to 5 (2 or 3 moist) and chroma of 2. It is dominantly silt loam, but the range includes very fine sandy loam. It ranges from slightly acid to mildly alkaline. The B horizon has hue of 10YR or 2.5Y, value of 4 to 7 (3 to 5 moist), and chroma of 2 or 3. It is typically silt loam, but the range includes silty clay loam. Reaction ranges from slightly acid to moderately alkaline. The C horizon typically has hue of 10YR, but the range includes 7.5YR and 2.5Y. Value is 6 to 8 (5 or 6 moist), and chroma is 2 or 3. The C horizon is silt loam or very fine sandy loam. Reaction is mildly alkaline or moderately alkaline.

Valentine series

The Valentine series consists of deep, excessively drained, rapidly permeable soils on uplands and stream terraces. They formed in eolian sand. Slope ranges from 0 to 60 percent, and the topography is usually hummocky.

Valentine soils are commonly adjacent to Anselmo, Els, Gates, and Hersh soils. Anselmo soils have a mollic epipedon. Els soils are somewhat poorly drained. Gates and Hersh soils have less sand throughout the profile.

Typical pedon (fig. 19) of Valentine fine sand, rolling, 2,490 feet west and 200 feet south of the northeast corner of sec. 5, T. 20 N., R. 24 W.:

A1—0 to 6 inches; grayish brown (10YR 5/2) fine sand, very dark grayish brown (10YR 3/2) moist; single grained; loose; neutral; gradual wavy boundary.

Figure 19.—Profile of Valentine loamy fine sand, rolling, which formed in eolian sand. The surface layer is about 6 inches thick. Depth in feet.

AC—6 to 12 inches; light brownish gray (10YR 6/2) fine sand, dark grayish brown (10YR 4/2) moist; single grained; loose; neutral; gradual wavy boundary.

C—12 to 60 inches; light gray (10YR 7/2) fine sand, grayish brown (10YR 5/2) moist; single grained; loose; neutral.

The thickness of the solum ranges from 5 to 17 inches.

The A horizon has color value of 4 to 6 (3 to 5 moist) and chroma of 2. It is dominantly fine sand and loamy fine sand. The C horizon has color value of 6 or 7 (5 or 6 moist) and chroma of 2 or 3. Reaction is slightly acid or neutral throughout the profile.

formation of the soils

Soil is produced by soil-forming processes acting on material deposited or accumulated by geologic agents. The characteristics of the soil are determined by the physical and mineralogical composition of the parent material, the climate under which the soil material has accumulated and existed since accummulation, the plant and animal life on and in the soil, the relief, or lay of the land, and the length of time the forces of soil formation have acted on the soil material.

Climate and plants and animals are the active factors of soil formation. They act on the parent material that has accumulated through the weathering of rocks and slowly change it to a natural body that has genetically related horizons. The effects of climate and plants and animals are conditioned by relief. The parent material also affects the kind of soil that is formed and in extreme cases, determines the kind almost entirely. Finally, time is needed for changing the parent material into a soil and for the differentiation of soil horizons. In general, a long time is required for the development of distinct horizons.

The factors of soils formation are so closely interrelated that few generalizations can be made regarding the effect of any one factor unless conditions are specified for the other four. Many of the processes of soil development are unknown.

parent material

Parent material is the weathered or partly weathered earthy material in which a soil forms. It determines the chemical and mineralogical composition of the soil. The parent materials of the soils in Custer County are loess, eolian sand, and alluvium.

Loess is wind-deposited silty material. Peoria loess is the most extensive parent material in Custer County. It is a thick mantle on tablelands and dissected uplands. It is generally grayish to brownish and is a few to a hundred feet in thickness. Coly, Holdrege, Uly, and Scott soils formed in Peoria loess. Cozad, Hord, and Hobbs soils are on stream terraces and bottom lands and formed in alluvial material derived mainly from Peoria loess. Gates and Kenesaw soils formed in the more recent Bignel loess, which overlies the Peoria loess in the loess-sand transition areas adjacent to the sandhills. Underlying Peoria loess is Loveland formation, which ranges from silty to sandy and has reddish brown colors. No soils have developed in the Loveland formation in Custer County because it generally is exposed only at the base of deep canyons and road cuts.

Eolian sand covers a large area in the northwestern part of Custer County and scattered smaller areas. This material consists of pale brown to very pale brown wind-deposited sand. Its thickness ranges from a few feet to as much as 100 feet. Eolian sand was deposited as gently rolling to hilly uplands and valleys. Valentine soils are the main soils which formed in this material. They have very little profile development because eolian sand is resistant to weathering. Anselmo and Hersh soils formed in mixed eolian sand and silt in loess-sand transition areas bordering the sandhills.

Alluvium is material deposited by water on bottom lands and terraces of broad stream valleys or in narrow upland drainageways. Alluvium ranges widely in texture because of differences in the materials from which it was derived and in the manner in which it was deposited. In Custer County, the soils that formed in alluvium on stream terraces are in the Cozad, Hall, and Hord series. The soils that formed in more recent alluvium on bottom lands are in the Barney, Boel, Ord, Gannett, Loup, and Hobbs series.

climate

Climate is important in the formation of soils. It directly affects parent material and indirectly influences vegetation and micro-organisms. Custer County has cold winters and hot summers. Rainfall is heaviest in late spring and early summer and averages about 21 inches per year.

Rainfall, fluctuating temperature, and wind weather parent material. Because rainfall is relatively low, the soils of Custer County are generally not deeply leached. Rainfall produces runoff water, which removes, relocates, and sorts soil material. Wind also removes, sorts, and redeposits material such as the extensive deposits of loess in this county.

Because the humidity in Custer County is generally low, much water is lost to evaporation and transpiration. This loss reduces the amount available for leaching, plant growth, decomposition of organic matter, and chemical weathering. Drying aids in the development of granular structure in the surface layer of many soils.

Micro-organisms in the soil are most active within a certain temperature range; thus, the rate at which organic matter is decomposed to humus varies with

climatic changes. Changes in temperature and moisture activate chemical and physical changes in the parent material and soil. Alternate freezing and thawing hasten physical disintegration of the parent material and enhance development of soil structure.

plants and animals

Plants, micro-organisms, earthworms, and other animals are active in soil formation.

The soils of Custer County formed mainly under a mixture of short, medium, and tall grasses. Each year the grasses formed new growth above ground, and their fibrous roots penetrated the upper few feet of soil. A darkened surface layer developed and gradually became thicker as more organic matter decayed to form humus. Because of additional humus, these soils developed granular structure and good tilth.

Plant roots bring nutrients to the surface. Calcium in particular helps to keep soil more porous. The decomposition of organic material forms organic acids that hasten leaching.

Micro-organisms change undecomposed organic matter into humus. Some bacteria take in nitrogen from the air; when they die the nitrogen becomes available for plant growth. Other bacteria oxidize sulphur, which then also becomes available to plants. The plants, in turn, complete the cycle by producing more organic matter. Algae, fungi, protozoa, and actinomycetes also affect soil formation physically and chemically. Larger animals such as gophers, moles, earthworms, millipedes, spiders, and insects mix the soil and contribute to the soil's organic matter when they die.

Human activities affect both the rate and direction of soil-forming processes. Conservation tillage and terraces reduce erosion under cultivation. Cultivation can contribute to soil loss and loss of fertility unless care is taken to conserve the soil.

relief

Relief influences runoff, erosion, aeration, and drainage of soils. Runoff is more rapid on steep and very steep soils than on less steep ones. Consequently, less water penetrates the soil, plant growth generally is less vigorous, horizons are thinner and less distinct, and lime is not so deeply leached. Erosion is more severe on the steeper slopes if all other factors are equal.

In soils that have the same parent material, the influence of relief is evident in the color, thickness, and horizonation of the soils. The gradient, shape, length, and direction of the slope influence the amount of moisture in the soil. Steep and very steep soils, such as Coly soils, are weakly developed, have a thin surface layer, and have lime at or near the surface. In the less sloping Uly soils, the surface layer is thicker, lime has been leached to a greater depth, and a thin subsoil has formed. In the very gently sloping to gently sloping Holdrege soils, the surface layer is dark and thick, the subsoil is well developed, and lime has been leached to a greater depth. Scott soils formed in depressions and are the most strongly developed soils in Custer County. Coly, Uly, Holdrege, and Scott soils all formed in Peoria loess; their differences are largely due to differences in relief.

Barney, Gibbon, Inavale, Hobbs, Boel, Gannett, and Loup soils are on bottom lands and have low relief. Soils on bottom lands are weakly developed because they often receive fresh sediment from flooding. Each flood provides new parent material and starts a new cycle of soil formation.

time

Relief, climate, and plant and animal life require time to change the parent material into soil. If the parent material has been in place for only a short time, the factors of soil formation will have had little effect on it. The degree of profile development (maturity) depends on the time of weathering and on intensity of the soil forming factors. Differences in length of time that geological materials have been in place are commonly reflected in the distinctness of horizons in the soil profile.

The concept of soil maturity relates time to the other four soil-forming factors. The maturity of a soil depends on the interaction of all five factors. A very steep Coly soil that does not have a B horizon may have progressed to the limit of formation in its position and climate.

The time required for a soil to progress to the limit of formation depends mainly on the kind of parent material and the climate. The parent material's resistance to weathering partially determines the length of time required to form a mature soil. Generally, soils in warm and humid areas form faster than soils in cool and dry areas.

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glossary

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher), or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	More than 12

Base saturation. The degree to which material having cation exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation exchange capacity.

Bottom land. The normal flood plain of a stream, subject to flooding.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15.2 to 38.1 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conservation tillage. A tillage system that does not invert the soil and that leaves all or part of the crop residue on the soil surface throughout the year.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.
Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.
Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.
Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.
Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.
Soft.—When dry, breaks into powder or individual grains under very slight pressure.
Cemented.—Hard; little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Crowning. Grading a road so that the center is elevated to improve surface drainage.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deferred grazing. Postponing grazing or arresting grazing for a prescribed period.

Depth, soil. The total thickness of weathered soil material over mixed sand, gravel, or bedrock. In this survey the classes of soil depth are *very shallow,* 0 to 10 inches; *shallow,* 10 to 20 inches; *moderately deep,* 20 to 40 inches; and *deep,* more than 40 inches.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.
Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.
Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.
Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.
Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.
Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.
Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Excess lime (in tables). Excess carbonates in the soil that restrict the growth of some plants.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, and clay.

Foot slope. The inclined surface at the base of a hill.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual.* The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow

infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Moderately coarse textured soil. Sandy loam and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color having hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Organic matter content. The amount of organic matter in soil material. The classes used in this survey are *very low,* less than 0.5 percent organic matter present; *low,* 0.5 to 1.0 percent; *moderately low,* 1.0 to 2.0 percent; *moderate,* 2.0 to 4.0 percent; and *high,* 4.0 to 8.0 percent.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to

permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.20 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. The water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor filter (in tables). Because of rapid permeability or an impermeable layer near the surface, the soil may not adequately filter effluent from a waste disposal system.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Range condition. The present composition of the plant community on a range site in relation to the potential natural plant community for that site. Range condition is expressed as excellent, good, fair, or poor, on the basis of how much the present plant community has departed from the potential.

Range site. An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All of the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and runoff water.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can

damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. The classes of slope used in this survey are as follows:

Nearly level	0 to 2 percent
Very gently sloping	1 to 3 percent
Gently sloping	3 to 6 percent
Strongly sloping	6 to 11 percent
Moderately steep	11 to 15 percent
Steep	15 to 30 percent
Very steep	more than 30 percent

Slope (in tables). Slope is great enough that special practices are required to insure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 mm in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Tableland (geology). An elevated, comparatively level area of land.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further

divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded in the period 1951-73 at Broken Bow, Nebraska]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days[1]	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F		In	In	In		In
January----	36.5	9.4	22.9	67	-24	0	0.42	0.10	0.67	2	5.3
February---	41.5	14.9	28.2	74	-16	0	0.61	0.19	0.94	2	5.0
March------	47.8	21.1	34.5	82	-7	32	1.11	0.30	1.76	3	6.5
April------	62.4	33.4	47.9	89	11	74	1.89	1.02	2.60	5	1.8
May--------	72.7	45.0	58.9	93	21	287	3.29	1.56	4.70	7	0.3
June-------	82.6	55.3	68.9	101	35	567	3.58	2.28	4.75	7	0.0
July-------	87.8	60.3	74.1	103	43	747	3.40	1.73	4.75	7	0.0
August-----	86.8	59.2	73.0	102	42	713	2.82	1.16	4.16	5	0.0
September--	77.2	48.0	62.6	98	24	384	2.21	0.84	3.33	5	0.0
October----	67.5	35.5	51.5	91	14	134	1.10	0.26	1.75	3	1.0
November---	51.1	22.1	36.6	76	33	0	0.56	0.09	0.92	2	3.0
December---	39.7	13.4	26.6	69	-18	0	0.52	0.22	0.76	2	6.2
Year----	62.8	34.8	48.8	105	-24	2,938	21.51	17.33	26.26	50	29.1

[1]A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50° F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Recorded in the period 1951-73 at Broken Bow, Nebraska]

Probability	Temperature: 24° F or lower	Temperature: 28° F or lower	Temperature: 32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	May 11	May 23	May 31
2 years in 10 later than--	May 5	May 17	May 26
5 years in 10 later than--	April 25	May 7	May 17
First freezing temperature in fall:			
1 year in 10 earlier than--	September 25	September 12	September 5
2 years in 10 earlier than--	September 30	September 18	September 11
5 years in 10 earlier than--	October 11	October 1	September 20

TABLE 3.--GROWING SEASON

[Recorded in the period 1951-73 at Broken Bow, Nebraska]

Probability	Daily minimum temperature during growing season: Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	148	124	110
8 years in 10	155	132	115
5 years in 10	168	146	126
2 years in 10	182	161	136
1 year in 10	189	169	142

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
AfB	Anselmo loamy fine sand, 0 to 3 percent slopes	1,330	0.1
An	Anselmo fine sandy loam, 0 to 2 percent slopes	7,300	0.4
AnC	Anselmo fine sandy loam, 2 to 6 percent slopes	10,880	0.7
Ao	Anselmo very fine sandy loam, 0 to 1 percent slopes	4,190	0.3
AoB	Anselmo very fine sandy loam, 1 to 3 percent slopes	1,670	0.1
Ba	Barney fine sandy loam, 0 to 2 percent slopes	3,190	0.2
Bn	Barney Variant loam, 0 to 1 percent slopes	750	*
Bo	Boel loamy fine sand, 0 to 2 percent slopes	5,340	0.3
Bp	Boel fine sandy loam, 0 to 2 percent slopes	930	0.1
BxB	Boel soils, channeled, 0 to 3 percent slopes	960	0.1
Ca	Cass fine sandy loam, 0 to 2 percent slopes	2,990	0.2
CoD2	Coly-Uly silt loams, 6 to 11 percent slopes, eroded	16,830	1.0
CoF2	Coly-Uly silt loams, 11 to 20 percent slopes, eroded	124,800	7.6
CrG	Coly-Hobbs silt loams, 2 to 60 percent slopes	123,150	7.5
Cs	Cozad silt loam, 0 to 1 percent slopes	2,540	0.2
CsC	Cozad silt loam, 3 to 6 percent slopes	5,920	0.4
Cz	Cozad silt loam, terrace, 0 to 1 percent slopes	21,750	1.3
CzB	Cozad silt loam, terrace, 1 to 3 percent slopes	24,870	1.5
DuB	Dunday loamy fine sand, 0 to 3 percent slopes	5,120	0.3
EcB	Els fine sand, 0 to 3 percent slopes	5,130	0.3
Fm	Fillmore Variant silt loam, 0 to 1 percent slopes	1,700	0.1
Ga	Gannett loam, 0 to 1 percent slopes	800	*
Gb	Gannett and Loup loams, 0 to 2 percent slopes	3,120	0.2
GfC	Gates very fine sandy loam, 3 to 6 percent slopes	11,720	0.7
GfD	Gates very fine sandy loam, 6 to 11 percent slopes	8,070	0.5
GfE	Gates very fine sandy loam, 11 to 15 percent slopes	5,580	0.3
GfF	Gates very fine sandy loam, 15 to 30 percent slopes	10,850	0.7
GhG	Gates-Hersh complex, 30 to 60 percent slopes	11,680	0.7
Gk	Gibbon silt loam, 0 to 1 percent slopes	1,190	0.1
Gr	Graybert very fine sandy loam, 0 to 1 percent slopes	1,340	0.1
GrB	Graybert very fine sandy loam, 1 to 3 percent slopes	2,930	0.2
GrC	Graybert very fine sandy loam, 3 to 6 percent slopes	640	*
Ha	Hall silt loam, 0 to 1 percent slopes	4,600	0.3
HaB	Hall silt loam, 1 to 3 percent slopes	24,280	1.5
HeB	Hersh fine sandy loam, 0 to 3 percent slopes	13,390	0.8
HeC	Hersh fine sandy loam, 3 to 6 percent slopes	18,540	1.1
HeD	Hersh fine sandy loam, 6 to 11 percent slopes	18,220	1.1
HeE	Hersh fine sandy loam, 11 to 15 percent slopes	3,520	0.2
HhF	Hersh-Valentine complex, 15 to 30 percent slopes	22,910	1.4
Hk	Hobbs silt loam, 0 to 2 percent slopes	26,360	1.6
Hm	Hobbs silt loam, channeled, 0 to 2 percent slopes	13,470	0.8
HoB	Holdrege silt loam, 1 to 3 percent slopes	2,910	0.2
HoC	Holdrege silt loam, 3 to 6 percent slopes	20,290	1.2
HoC2	Holdrege silty clay loam, 3 to 6 percent slopes, eroded	50,180	3.1
HoD	Holdrege silt loam, 6 to 11 percent slopes	35,400	2.2
HoD2	Holdrege silty clay loam, 6 to 11 percent slopes, eroded	37,860	2.3
HpB	Hord fine sandy loam, 0 to 3 percent slopes	2,010	0.1
Hr	Hord silt loam, 0 to 1 percent slopes	5,090	0.3
HrB	Hord silt loam, 1 to 3 percent slopes	16,510	1.0
HrC	Hord silt loam, 3 to 6 percent slopes	17,680	1.1
Ht	Hord silt loam, terrace, 0 to 1 percent slopes	6,310	0.4
HtB	Hord silt loam, terrace, 1 to 3 percent slopes	18,040	1.1
InB	Inavale loamy fine sand, 0 to 3 percent slopes	2,010	0.1
IpB	Ipage loamy fine sand, 0 to 3 percent slopes	7,030	0.4
Ks	Kenesaw very fine sandy loam, 0 to 1 percent slopes	9,000	0.5
KsB	Kenesaw very fine sandy loam, 1 to 3 percent slopes	8,980	0.5
Or	Ord very fine sandy loam, 0 to 1 percent slopes	2,000	0.1
Ov	Ovina loam, 0 to 2 percent slopes	1,830	0.1
Pg	Pits, gravel	100	*
Ru	Rusco silty clay loam, 0 to 1 percent slopes	2,340	0.1
Sc	Scott silty clay loam, 0 to 1 percent slopes	4,700	0.3
UbD	Uly silt loam, 6 to 11 percent slopes	12,240	0.7
UbE	Uly silt loam, 11 to 15 percent slopes	150,574	9.2
UcF	Uly-Coly silt loams, 15 to 30 percent slopes	369,450	22.5
VaB	Valentine fine sand, 0 to 3 percent slopes	9,530	0.6
VaD	Valentine fine sand, 3 to 9 percent slopes	5,250	0.3
VaE	Valentine fine sand, rolling	166,070	10.1
VaF	Valentine fine sand, rolling and hilly	34,710	2.1
VbB	Valentine loamy fine sand, 0 to 3 percent slopes	4,960	0.3
VbD	Valentine loamy fine sand, 3 to 9 percent slopes	16,830	1.0

See footnote at end of table.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
VbE	Valentine loamy fine sand, rolling	42,430	2.6
	Water	2,816	0.2
	Total	1,639,680	100.0

* Less than 0.1 percent.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE

[Yields in the N columns are for nonirrigated soils; those in the I columns are for irrigated soils. Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Soil name and map symbol	Corn		Grain sorghum		Winter wheat		Alfalfa hay	
	N	I	N	I	N	I	N	I
	Bu	Bu	Bu	Bu	Bu	Bu	Ton	Ton
AfB: Anselmo	30	110	35	95	26	---	2.0	4.2
An: Anselmo	35	130	45	110	35	---	2.1	5.5
AnC: Anselmo	34	125	42	100	26	---	1.8	4.9
Ao: Anselmo	40	140	55	115	37	---	2.5	5.8
AoB: Anselmo	37	135	45	100	34	---	2.4	5.5
Ba: Barney	---	---	---	---	---	---	---	---
Bn: Barney Variant	---	---	---	---	---	---	---	---
Bo: Boel	33	80	35	70	20	---	---	4.8
Bp: Boel	40	110	35	90	26	---	3.3	5.0
BxB: Boel	---	---	---	---	---	---	---	---
Ca: Cass	35	130	55	110	35	---	2.6	6.0
CoD2: Coly-Uly	26	95	30	85	24	---	1.7	5.0
CoF2: Coly-Uly	---	---	---	---	---	---	---	---
CrG: Coly-Hobbs	---	---	---	---	---	---	---	---
Cs: Cozad	46	145	55	120	40	---	2.9	6.0
CsC: Cozad	40	130	50	110	35	---	2.5	6.0
Cz: Cozad	48	145	58	120	41	---	3.9	6.5
CzB: Cozad	44	140	52	115	39	---	3.5	6.3
DuB: Dunday	28	110	32	95	20	---	1.5	4.5
EcB: Els	---	90	---	80	15	---	---	3.2
Fm: Fillmore Variant	33	105	40	95	26	---	2.5	5.0
Ga: Gannett	---	---	---	---	---	---	---	---

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn		Grain sorghum		Winter wheat		Alfalfa hay	
	N	I	N	I	N	I	N	I
	Bu	Bu	Bu	Bu	Bu	Bu	Ton	Ton
Gb----------------------- Gannett and Loup	---	---	---	---	---	---	---	---
GfC---------------------- Gates	35	125	40	110	32	---	2.4	6.0
GfD---------------------- Gates	26	95	30	85	24	---	1.7	5.0
GfE, GfF----------------- Gates	---	---	---	---	---	---	---	---
GhG---------------------- Gates-Hersh	---	---	---	---	---	---	---	---
Gk----------------------- Gibbon	55	130	60	115	40	---	4.0	6.1
Gr----------------------- Graybert	48	145	55	120	40	---	2.9	6.5
GrB---------------------- Graybert	44	140	52	115	38	---	2.8	6.3
GrC---------------------- Graybert	40	130	50	110	35	---	2.5	6.0
Ha----------------------- Hall	48	148	55	120	40	---	2.9	6.5
HaB---------------------- Hall	42	140	50	115	38	---	2.7	6.3
HeB---------------------- Hersh	33	125	40	95	28	---	1.7	4.6
HeC---------------------- Hersh	29	120	35	90	26	---	1.6	4.4
HeD---------------------- Hersh	26	95	25	20	22	---	1.5	3.9
HeE---------------------- Hersh	---	---	---	---	---	---	---	---
HhF---------------------- Hersh-Valentine	---	---	---	---	---	---	---	---
Hk----------------------- Hobbs	50	140	55	120	34	---	3.0	6.5
Hm----------------------- Hobbs	---	---	---	---	---	---	---	---
HoB---------------------- Holdrege	42	140	50	115	38	---	2.5	6.3
HoC---------------------- Holdrege	39	130	48	110	35	---	2.4	5.8
HoC2--------------------- Holdrege	35	120	45	105	30	---	2.0	5.5
HoD---------------------- Holdrege	28	115	35	95	28	---	1.8	5.5
HoD2--------------------- Holdrege	26	95	30	85	24	---	1.5	5.0
HpB---------------------- Hord	37	140	48	112	40	---	2.7	6.3

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn		Grain sorghum		Winter wheat		Alfalfa hay	
	N	I	N	I	N	I	N	I
	Bu	Bu	Bu	Bu	Bu	Bu	Ton	Ton
Hr----------------------- Hord	48	145	55	120	40	---	2.9	6.5
HrB---------------------- Hord	44	140	52	115	38	---	2.8	6.3
HrC---------------------- Hord	42	130	50	110	36	---	2.5	6.0
Ht----------------------- Hord	50	150	60	125	42	---	3.9	6.5
HtB---------------------- Hord	46	145	55	120	41	---	3.5	6.3
InB---------------------- Inavale	28	100	32	80	20	---	1.5	4.5
IpB---------------------- Ipage	28	100	32	80	20	---	1.5	4.5
Ks----------------------- Kenesaw	48	140	55	120	38	---	2.8	6.4
KsB---------------------- Kenesaw	44	135	52	115	36	---	2.6	6.2
Or----------------------- Ord	35	125	60	100	34	---	3.8	6.0
Ov----------------------- Ovina	35	125	60	110	34	---	3.8	6.0
Pg*---------------------- Pits	---	---	---	---	---	---	---	---
Ru----------------------- Rusco	45	130	50	120	36	---	3.2	5.0
Sc----------------------- Scott	20	---	25	---	15	---	---	---
UbD---------------------- Uly	30	115	35	95	28	---	2.0	5.6
UbE---------------------- Uly	---	---	---	---	---	---	---	---
UcF---------------------- Uly-Coly	---	---	---	---	---	---	---	---
VaB---------------------- Valentine	---	85	---	75	18	---	---	3.5
VaD---------------------- Valentine	---	80	---	70	13	---	---	2.5
VaE, VaF, VbE------------ Valentine	---	---	---	---	---	---	---	---
VbB---------------------- Valentine	28	100	32	90	20	---	1.5	3.6
VbD---------------------- Valentine	---	90	---	70	15	---	0.8	3.0

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 6.--CAPABILITY CLASSES AND SUBCLASSES

[All soils are assigned to nonirrigated capability subclasses (N). Only those potentially irrigable soils are assigned to irrigated subclasses (I). Miscellaneous areas are excluded. Dashes mean no acreage]

Class	Total acreage	Major management concerns (Subclass)			
		Erosion (e)	Wetness (w)	Soil problem (s)	Climate (c)
		Acres	Acres	Acres	Acres
I (N)	---	---	---	---	---
(I)	54,820	---	---	---	---
II (N)	201,030	112,490	33,720	---	54,820
(I)	159,600	125,880	33,720	---	---
III (N)	153,200	150,570	2,630	---	---
(I)	153,970	151,340	2,630	---	---
IV (N)	157,780	147,740	10,040	---	---
(I)	175,660	165,190	10,470	---	---
V (N)	8,070	---	8,070	---	---
VI (N)	946,394	932,924	13,470	---	---
VII (N)	169,600	169,600	---	---	---
VIII(N)	850	---	750	100	---

TABLE 7.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES

[Only the soils that support rangeland vegetation suitable for grazing are listed]

Soil name and map symbol	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
AfB, An, AnC, Ao, AoB: Anselmo	Sandy	Favorable	3,250	Little bluestem	25
		Normal	2,600	Sand bluestem	15
		Unfavorable	1,350	Prairie sandreed	15
				Needleandthread	15
				Blue grama	10
				Buffalograss	5
				Western wheatgrass	5
Ba: Barney	Wetland	Favorable	5,500	Prairie cordgrass	30
		Normal	5,000	Northern reedgrass	10
		Unfavorable	3,500	Sedge	10
				Rush	10
				Kentucky bluegrass	10
				Bluejoint reedgrass	5
				Switchgrass	5
				Common spikesedge	5
Bo, Bp: Boel	Subirrigated	Favorable	5,000	Big bluestem	30
		Normal	4,500	Indiangrass	15
		Unfavorable	3,700	Little bluestem	10
				Switchgrass	10
				Prairie cordgrass	10
				Sedge	5
Ca: Cass	Sandy Lowland	Favorable	4,500	Sand bluestem	30
		Normal	3,700	Little bluestem	15
		Unfavorable	2,500	Switchgrass	15
				Indiangrass	10
				Porcupinegrass	10
				Kentucky bluegrass	5
				Sedge	5
CoD2*, CoF2*:					
Coly	Limy Upland	Favorable	3,000	Little bluestem	25
		Normal	2,300	Big bluestem	20
		Unfavorable	1,500	Blue grama	15
				Sideoats grama	10
				Plains muhly	5
				Western wheatgrass	5
				Sedge	5
Uly	Silty	Favorable	3,200	Big bluestem	35
		Normal	2,400	Little bluestem	25
		Unfavorable	1,500	Western wheatgrass	12
				Blue grama	6
				Sedge	5
CrG*:					
Coly	Thin Loess	Favorable	2,500	Little bluestem	30
		Normal	2,000	Sideoats grama	15
		Unfavorable	1,200	Big bluestem	10
				Plains muhly	10
				Blue grama	10
				Western wheatgrass	5
				Sedge	5

See footnote at end of table.

TABLE 7.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
CrG*:					
Hobbs	Silty Overflow	Favorable	5,000	Big bluestem	35
		Normal	4,300	Switchgrass	10
		Unfavorable	3,000	Little bluestem	10
				Western wheatgrass	10
				Indiangrass	5
				Sideoats grama	5
				Tall dropseed	5
				Kentucky bluegrass	5
				Sedge	5
Cs Cozad	Silty	Favorable	4,000	Big bluestem	20
		Normal	3,200	Little bluestem	20
		Unfavorable	2,000	Blue grama	10
				Sideoats grama	10
				Switchgrass	5
				Indiangrass	5
				Buffalograss	5
				Green muhly	5
				Sedge	5
				Western wheatgrass	5
CsC Cozad	Silty	Favorable	4,000	Big bluestem	20
		Normal	3,200	Little bluestem	20
		Unfavorable	2,000	Blue grama	10
				Sideoats grama	10
				Switchgrass	5
				Indiangrass	5
				Buffalograss	5
				Green muhly	5
				Sedge	5
				Western wheatgrass	5
Cz, CzB Cozad	Silty Lowland	Favorable	4,500	Big bluestem	35
		Normal	3,500	Little bluestem	15
		Unfavorable	2,500	Switchgrass	15
				Indiangrass	5
				Sideoats grama	5
				Green muhly	5
				Sedge	5
				Western wheatgrass	5
DuB Dunday	Sandy	Favorable	3,000	Sand bluestem	25
		Normal	2,500	Little bluestem	20
		Unfavorable	1,700	Prairie sandreed	15
				Needleandthread	10
				Blue grama	10
				Switchgrass	5
				Sedge	5
EcB Els	Subirrigated	Favorable	5,000	Big bluestem	30
		Normal	4,000	Indiangrass	15
		Unfavorable	3,000	Little bluestem	10
				Switchgrass	10
				Prairie cordgrass	10
				Slender wheatgrass	5
				Sedge	5
				Kentucky bluegrass	5
Fm Fillmore Variant	Silty Overflow	Favorable	5,000	Big bluestem	35
		Normal	4,300	Western wheatgrass	15
		Unfavorable	3,000	Little bluestem	10
				Switchgrass	10
				Sideoats grama	10
				Kentucky bluegrass	5
				Sedge	5

See footnote at end of table.

TABLE 7.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
Ga: Gannett	Wetland	Favorable	6,250	Prairie cordgrass	45
		Normal	5,500	Sedge	15
		Unfavorable	4,500	Reedgrass	10
				Slender wheatgrass	5
Gb*:					
Gannett	Wet Subirrigated	Favorable	6,000	Switchgrass	25
		Normal	5,300	Indiangrass	15
		Unfavorable	4,000	Prairie cordgrass	15
				Big bluestem	10
				Sedge	10
				Slender wheatgrass	5
				Plains bluegrass	5
Loup	Wet Subirrigated	Favorable	6,300	Switchgrass	30
		Normal	5,500	Indiangrass	15
		Unfavorable	4,200	Prairie cordgrass	15
				Big bluestem	10
				Plains bluegrass	5
				Sedge	5
				Canada wildrye	5
GfC, GfD, GfE, GfF: Gates	Silty	Favorable	3,500	Big bluestem	30
		Normal	2,800	Little bluestem	15
		Unfavorable	1,800	Indiangrass	10
				Switchgrass	10
				Sideoats grama	5
				Blue grama	5
				Needleandthread	5
				Sedge	5
				Leadplant	5
GhG*:					
Gates	Silty	Favorable	3,500	Big bluestem	30
		Normal	2,800	Little bluestem	15
		Unfavorable	1,800	Indiangrass	10
				Switchgrass	10
				Sideoats grama	5
				Blue grama	5
				Needleandthread	5
				Sedge	5
				Leadplant	5
Hersh	Sandy	Favorable	3,000	Little bluestem	20
		Normal	2,300	Sand bluestem	15
		Unfavorable	1,500	Blue grama	15
				Prairie sandreed	10
				Needleandthread	10
				Sideoats grama	5
				Switchgrass	5
				Sand dropseed	5
				Western wheatgrass	5
Gk: Gibbon	Subirrigated	Favorable	5,500	Big bluestem	30
		Normal	5,000	Indiangrass	15
		Unfavorable	4,500	Little bluestem	10
				Switchgrass	10
				Prairie cordgrass	10
				Sedge	10
				Kentucky bluegrass	5
Gr, GrB, GrC: Graybert	Silty	Favorable	3,300	Big bluestem	20
		Normal	2,800	Little bluestem	15
		Unfavorable	2,000	Sideoats grama	10
				Blue grama	10
				Western wheatgrass	10
				Switchgrass	5
				Buffalograss	5
				Sedge	5

See footnote at end of table.

TABLE 7.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
Ha: Hall	Silty	Favorable	4,500	Big bluestem	35
		Normal	4,000	Little bluestem	15
		Unfavorable	3,000	Switchgrass	10
				Indiangrass	10
				Western wheatgrass	10
				Canada wildrye	5
				Sedge	5
HaB: Hall	Silty	Favorable	3,500	Big bluestem	25
		Normal	2,800	Little bluestem	20
		Unfavorable	2,000	Western wheatgrass	15
				Sideoats grama	10
				Switchgrass	5
				Indiangrass	5
				Sedge	5
				Blue grama	5
HeB, HeC, HeD, HeE: Hersh	Sandy	Favorable	3,000	Little bluestem	20
		Normal	2,300	Sand bluestem	15
		Unfavorable	1,500	Blue grama	15
				Prairie sandreed	10
				Needleandthread	10
				Sideoats grama	5
				Switchgrass	5
				Sand dropseed	5
				Western wheatgrass	5
HhF*:					
Hersh	Sandy	Favorable	3,000	Little bluestem	20
		Normal	2,300	Sand bluestem	15
		Unfavorable	1,500	Blue grama	15
				Prairie sandreed	10
				Needleandthread	10
				Sideoats grama	5
				Switchgrass	5
				Sand dropseed	5
				Western wheatgrass	5
Valentine	Sands	Favorable	2,800	Little bluestem	25
		Normal	2,300	Sand bluestem	20
		Unfavorable	1,500	Prairie sandreed	15
				Switchgrass	10
				Sand lovegrass	5
				Blue grama	5
				Needleandthread	5
Hk, Hm: Hobbs	Silty Overflow	Favorable	5,000	Big bluestem	35
		Normal	4,300	Switchgrass	10
		Unfavorable	3,000	Little bluestem	10
				Western wheatgrass	10
				Indiangrass	5
				Sideoats grama	5
				Tall dropseed	5
				Kentucky bluegrass	5
				Sedge	5
HoB, HoC, HoC2, HoD, HoD2: Holdrege	Silty	Favorable	3,500	Big bluestem	20
		Normal	2,800	Little bluestem	20
		Unfavorable	1,700	Sideoats grama	10
				Blue grama	10
				Western wheatgrass	10
				Indiangrass	5
				Buffalograss	5
				Sand dropseed	5
				Sedge	5

See footnote at end of table.

TABLE 7.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
HpB: Hord	Silty Lowland	Favorable	4,000	Sand bluestem	35
		Normal	3,250	Little bluestem	20
		Unfavorable	1,750	Sand dropseed	15
				Indiangrass	5
				Switchgrass	5
				Blue grama	5
				Needleandthread	5
				Sedge	5
Hr, HrB: Hord	Silty Lowland	Favorable	4,500	Big bluestem	30
		Normal	3,500	Little bluestem	10
		Unfavorable	2,000	Switchgrass	10
				Indiangrass	5
				Sideoats grama	5
				Blue grama	5
				Tall dropseed	5
				Western wheatgrass	5
				Porcupinegrass	5
				Sedge	5
HrC: Hord	Silty	Favorable	4,500	Big bluestem	30
		Normal	3,500	Little bluestem	10
		Unfavorable	2,000	Switchgrass	10
				Indiangrass	5
				Sideoats grama	5
				Blue grama	5
				Tall dropseed	5
				Western wheatgrass	5
				Porcupinegrass	5
				Sedge	5
Ht, HtB: Hord	Silty Lowland	Favorable	4,500	Big bluestem	30
		Normal	3,500	Little bluestem	10
		Unfavorable	2,000	Switchgrass	10
				Indiangrass	5
				Sideoats grama	5
				Blue grama	5
				Tall dropseed	5
				Western wheatgrass	5
				Porcupinegrass	5
				Sedge	5
InB: Inavale	Sandy Lowland	Favorable	3,800	Sand bluestem	30
		Normal	3,000	Prairie sandreed	20
		Unfavorable	2,200	Little bluestem	15
				Needleandthread	15
				Switchgrass	5
				Porcupinegrass	5
				Sedge	5
IpB: Ipage	Sandy Lowland	Favorable	4,000	Sand bluestem	15
		Normal	3,500	Prairie sandreed	15
		Unfavorable	2,500	Little bluestem	10
				Needleandthread	10
				Kentucky bluegrass	5
				Indiangrass	5
				Prairie junegrass	5
				Sedge	5
				Switchgrass	5
				Blue grama	5
				Scribner panicum	5
				Leadplant	5

See footnote at end of table.

TABLE 7.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
Ks, KsB: Kenesaw	Silty	Favorable	3,000	Big bluestem	25
		Normal	2,500	Little bluestem	15
		Unfavorable	1,700	Sideoats grama	10
				Blue grama	10
				Western wheatgrass	10
				Switchgrass	5
				Buffalograss	5
				Sand dropseed	5
				Sedge	5
Or: Ord	Subirrigated	Favorable	6,000	Big bluestem	30
		Normal	5,500	Indiangrass	15
		Unfavorable	5,000	Little bluestem	10
				Switchgrass	10
				Prairie cordgrass	10
				Kentucky bluegrass	5
Ov: Ovina	Subirrigated	Favorable	5,700	Big bluestem	25
		Normal	5,000	Little bluestem	15
		Unfavorable	4,200	Indiangrass	10
				Switchgrass	10
				Prairie cordgrass	10
				Canada wildrye	5
				Kentucky bluegrass	5
Ru: Rusco	Silty Overflow	Favorable	4,500	Big bluestem	30
		Normal	4,000	Western wheatgrass	15
		Unfavorable	3,000	Switchgrass	10
				Indiangrass	10
				Canada wildrye	5
				Little bluestem	5
				Sedge	5
				Prairie junegrass	5
UbD, UbE: Uly	Silty	Favorable	3,200	Big bluestem	35
		Normal	2,400	Little bluestem	25
		Unfavorable	1,500	Western wheatgrass	12
				Blue grama	6
				Sedge	5
UcF*:					
Uly	Silty	Favorable	3,200	Big bluestem	35
		Normal	2,400	Little bluestem	25
		Unfavorable	1,500	Western wheatgrass	12
				Blue grama	6
				Sedge	5
Coly	Limy Upland	Favorable	3,000	Little bluestem	25
		Normal	2,300	Big bluestem	20
		Unfavorable	1,500	Blue grama	15
				Sideoats grama	10
				Plains muhly	5
				Western wheatgrass	5
				Sedge	5
VaB: Valentine	Sandy	Favorable	3,000	Little bluestem	20
		Normal	2,200	Prairie sandreed	20
		Unfavorable	1,200	Sand bluestem	10
				Blue grama	10
				Needleandthread	10
				Sand dropseed	8
				Switchgrass	5
				Prairie junegrass	5

See footnote at end of table.

TABLE 7.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
VaD Valentine	Sandy	Favorable	3,000	Sand bluestem	20
		Normal	2,400	Little bluestem	20
		Unfavorable	1,800	Prairie sandreed	15
				Needleandthread	10
				Switchgrass	5
				Sand lovegrass	5
				Blue grama	5
				Sand dropseed	5
VaE Valentine	Sands	Favorable	3,000	Sand bluestem	20
		Normal	2,400	Little bluestem	20
		Unfavorable	1,800	Prairie sandreed	15
				Needleandthread	10
				Switchgrass	5
				Sand lovegrass	5
				Blue grama	5
				Sand dropseed	5
VaF*:					
Valentine					
Rolling part	Sands	Favorable	3,000	Sand bluestem	20
		Normal	2,400	Little bluestem	20
		Unfavorable	1,800	Prairie sandreed	15
				Needleandthread	10
				Switchgrass	5
				Sand lovegrass	5
				Blue grama	5
				Sand dropseed	5
Hilly part	Choppy Sands	Favorable	2,800	Little bluestem	25
		Normal	2,300	Sand bluestem	20
		Unfavorable	1,500	Prairie sandreed	15
				Switchgrass	10
				Sand lovegrass	5
				Blue grama	5
				Needleandthread	5
VbB Valentine	Sandy	Favorable	3,000	Little bluestem	20
		Normal	2,200	Prairie sandreed	20
		Unfavorable	1,200	Sand bluestem	10
				Blue grama	10
				Needleandthread	10
				Sand dropseed	8
				Switchgrass	5
				Prairie junegrass	5
VbD Valentine	Sandy	Favorable	3,000	Sand bluestem	20
		Normal	2,400	Little bluestem	20
		Unfavorable	1,800	Prairie sandreed	15
				Needleandthread	10
				Switchgrass	5
				Sand lovegrass	5
				Blue grama	5
				Sand dropseed	5
VbE Valentine	Sands	Favorable	3,000	Sand bluestem	20
		Normal	2,400	Little bluestem	20
		Unfavorable	1,800	Prairie sandreed	15
				Needleandthread	10
				Switchgrass	5
				Sand lovegrass	5
				Blue grama	5
				Sand dropseed	5

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS

[The symbol < means less than; > means more than. Absence of an entry indicates that trees generally do not grow to the given height on that soil]

Soil name and map symbol	Trees having predicted 20-year average heights, in feet, of-- <8	8-15	16-25	26-35	>35
AfB, An, AnC, Ao, AoB. Anselmo	Lilac, American plum.	Common chokecherry	Eastern redcedar, Austrian pine, ponderosa pine, Scotch pine, honeylocust, green ash, common hackberry, Russian mulberry.	Siberian elm	---
Ba. Barney	Redosier dogwood	---	---	Golden willow	Eastern cottonwood.
Bn*. Barney Variant					
Bo, Bp. Boel	Redosier dogwood, American plum.	Common chokecherry	Common hackberry, green ash, Austrian pine, Russian mulberry, eastern redcedar.	Honeylocust, silver maple, golden willow.	Eastern cottonwood.
BxB*. Boel					
Ca. Cass	Lilac, American plum.	Common chokecherry	Eastern redcedar, Austrian pine, ponderosa pine, Scotch pine, honeylocust, green ash, common hackberry, Russian mulberry.	Siberian elm	---
CoD2*, CoF2*: Coly	Silver buffaloberry, fragrant sumac, Siberian peashrub, Tatarian honeysuckle.	Eastern redcedar, Rocky Mountain juniper, bur oak, Russian-olive.	Green ash, ponderosa pine, honeylocust, Siberian elm.	---	---
Uly	Amur honeysuckle, lilac.	Common chokecherry, Russian mulberry.	Eastern redcedar, green ash, Russian-olive, honeylocust, Austrian pine, common hackberry, bur oak.	Siberian elm	---
CrG*: Coly.					
Hobbs.					
Cs, CsC. Cozad	Lilac, fragrant sumac, Amur honeysuckle.	Russian mulberry, Russian-olive.	Eastern redcedar, Austrian pine, green ash, honeylocust, bur oak, common hackberry.	Siberian elm	---

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average heights, in feet, of--				
	<8	8-15	16-25	26-35	>35
Cz, CzB: Cozad	American plum	Lilac, Amur honeysuckle.	Eastern redcedar, Austrian pine, Russian-olive, ponderosa pine, green ash, Russian mulberry.	Common hackberry, honeylocust.	Eastern cottonwood.
DuB: Dunday	Skunkbush sumac, Tatarian honeysuckle, lilac.	Eastern redcedar, Manchurian crabapple, Russian-olive, Siberian peashrub.	Ponderosa pine, green ash, common hackberry, honeylocust.	Siberian elm	---
EcB: Els	Lilac	Tatarian honeysuckle, common chokecherry, Siberian peashrub.	Eastern redcedar, green ash, common hackberry, ponderosa pine.	Honeylocust, silver maple, golden willow.	Eastern cottonwood.
Fm: Fillmore Variant	Redosier dogwood, American plum.	Common chokecherry	Russian mulberry, eastern redcedar, Austrian pine, common hackberry, green ash.	Honeylocust, golden willow, silver maple.	Eastern cottonwood.
Ga. Gannett					
Gb*:					
Gannett	Redosier dogwood	---	---	Golden willow	Eastern cottonwood.
Loup	Redosier dogwood	---	---	Golden willow	Eastern cottonwood.
GfC, GfD, GfE: Gates	Amur honeysuckle, fragrant sumac, lilac.	Russian mulberry	Green ash, honeylocust, Russian-olive, eastern redcedar, Austrian pine, common hackberry.	Siberian elm	---
GfF. Gates					
GhG*:					
Gates.					
Hersh.					
Gk: Gibbon	Redosier dogwood	Common chokecherry, American plum.	Eastern redcedar, common hackberry.	Green ash, honeylocust, golden willow, Austrian pine.	Eastern cottonwood.
Gr, GrB, GrC: Graybert	Fragrant sumac, lilac, Amur honeysuckle.	Russian mulberry	Austrian pine, bur oak, honeylocust, eastern redcedar, green ash, common hackberry, Russian-olive.	Siberian elm	---

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average heights, in feet, of--				
	<8	8-15	16-25	26-35	>35
Ha----------------- Hall	Amur honeysuckle, lilac, fragrant sumac.	Russian mulberry	Eastern redcedar, Austrian pine, green ash, Russian mulberry Russian-olive, honeylocust, common hackberry, bur oak.	Siberian elm------	---
HaB----------------- Hall	Amur honeysuckle, lilac, fragrant sumac.	Russian mulberry	Eastern redcedar, Austrian pine, green ash, honeylocust, common hackberry, bur oak, Russian-olive.	Siberian elm------	---
HeB, HeC, HeD, HeE--------------- Hersh	Lilac, American plum.	Common chokecherry	Eastern redcedar, honeylocust, common hackberry, ponderosa pine, green ash, Russian mulberry, Scotch pine, Austrian pine.	Siberian elm------	---
HhF*: Hersh.					
Valentine.					
Hk----------------- Hobbs	American plum-----	Lilac, Amur honeysuckle.	Eastern redcedar, Austrian pine, Russian-olive, green ash, Russian mulberry, ponderosa pine.	Common hackberry, honeylocust.	Eastern cottonwood.
Hm. Hobbs					
HoB, HoC, HoC2, HoD, HoD2-------- Holdrege	Lilac, Amur honeysuckle, fragrant sumac.	Russian mulberry	Eastern redcedar, Austrian pine, green ash, honeylocust, common hackberry, bur oak, Russian-olive.	Siberian elm------	---
HpB, Hr, HrB, HrC Hord	Amur honeysuckle, fragrant sumac, lilac.	Russian mulberry, Russian-olive.	Eastern redcedar, Austrian pine, green ash, common hackberry, honeylocust, bur oak.	Siberian elm------	---
Ht, HtB----------- Hord	American plum-----	Lilac, Tatarian honeysuckle.	Eastern redcedar, ponderosa pine, Austrian pine, green ash, Russian mulberry, Russian-olive.	Honeylocust, common hackberry.	Eastern cottonwood.

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average heights, in feet, of--				
	<8	8-15	16-25	26-35	>35
InB: Inavale	Lilac, American plum.	Common chokecherry	Eastern redcedar, Austrian pine, Scotch pine, Russian mulberry, green ash, honeylocust, common hackberry, Russian mulberry.	Siberian elm	---
IpB: Ipage	Tatarian honeysuckle, skunkbush sumac, Siberian peashrub.	Russian-olive, eastern redcedar, Manchurian crabapple.	Ponderosa pine, green ash, common hackberry, honeylocust.	Siberian elm	---
Ks, KsB: Kenesaw	Fragrant sumac, Amur honeysuckle, lilac.	Russian mulberry	Eastern redcedar, green ash, honeylocust, common hackberry, Russian-olive, bur oak, Austrian pine.	Siberian elm	---
Or: Ord	Redosier dogwood, American plum.	Common chokecherry	Eastern redcedar, Austrian pine, Russian mulberry, green ash, common hackberry.	Silver maple, honeylocust, golden willow.	Eastern cottonwood.
Ov: Ovina	American plum, redosier dogwood.	Common chokecherry	Eastern redcedar, common hackberry, Austrian pine, green ash, honeylocust, Russian mulberry.	Golden willow	Eastern cottonwood.
Pg*. Pits					
Ru: Rusco	American plum	Amur honeysuckle, lilac.	Green ash, Austrian pine, ponderosa pine, eastern redcedar, Russian mulberry, Russian-olive.	Honeylocust, common hackberry.	Eastern cottonwood.
Sc. Scott					
UbD, UbE: Uly	Amur honeysuckle, lilac.	Common chokecherry, Russian mulberry.	Eastern redcedar, green ash, Russian-olive, honeylocust, Austrian pine, common hackberry, bur oak.	Siberian elm	---
UcF*:					
Uly.					
Coly.					

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average heights, in feet, of-- <8	8-15	16-25	26-35	>35
VaB--------------- Valentine	Lilac, American plum.	Common chokecherry	Eastern redcedar, Austrian pine, ponderosa pine, Scotch pine, honeylocust, green ash, common hackberry, Russian mulberry.	Siberian elm------	---
VaD, VaE---------- Valentine	---	Eastern redcedar, Rocky Mountain juniper.	Austrian pine, ponderosa pine, jack pine.	---	---
VaF. Valentine					
VbB--------------- Valentine	Lilac, American plum.	Common chokecherry	Eastern redcedar, Austrian pine, ponderosa pine, Scotch pine, honeylocust, green ash, common hackberry, Russian mulberry.	Siberian elm------	---
VbD, VbE---------- Valentine	---	Eastern redcedar, Rocky Mountain juniper.	Austrian pine, ponderosa pine, jack pine.	---	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
AfB, An: Anselmo	Slight	Slight	Slight	Slight	Slight.
AnC: Anselmo	Slight	Slight	Moderate: slope.	Slight	Slight.
Ao: Anselmo	Slight	Slight	Slight	Slight	Slight.
AoB: Anselmo	Slight	Slight	Moderate: slope.	Slight	Slight.
Ba: Barney	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
Bn: Barney Variant	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: flooding, ponding.
Bo, Bp: Boel	Severe: flooding.	Moderate: flooding, wetness.	Slight	Moderate: wetness, flooding.	Moderate: wetness, droughty, flooding.
BxB*: Boel	Severe: flooding.	Moderate: flooding, wetness.	Slight	Moderate: wetness, flooding.	Severe: flooding.
Ca: Cass	Severe: flooding.	Slight	Slight	Slight	Slight.
CoD2*:					
Coly	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Uly	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
CoF2*					
Coly	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Uly	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
CrG*:					
Coly	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Hobbs	Severe: flooding.	Slight	Moderate: slope, flooding.	Slight	Moderate: flooding.
Cs, CsC: Cozad	Slight	Slight	Slight	Slight	Slight.
Cz: Cozad	Severe: flooding.	Slight	Slight	Slight	Slight.
CzB: Cozad	Severe: flooding.	Slight	Moderate: slope.	Slight	Slight.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
DuB: Dunday	Slight	Slight	Slight	Slight	Moderate: droughty.
EcB: Els	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: wetness, droughty.
Fm: Fillmore Variant	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, erodes easily.	Severe: ponding.
Ga: Gannett	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Gb*:					
Gannett	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Loup	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
GfC: Gates	Slight	Slight	Moderate: slope.	Severe: erodes easily.	Slight.
GfD, GfE: Gates	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
GfF: Gates	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
GhG*:					
Gates	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Hersh	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Gk: Gibbon	Severe: flooding.	Moderate: wetness.	Moderate: wetness, flooding.	Moderate: wetness.	Moderate: wetness, flooding.
Gr: Graybert	Slight	Slight	Slight	Severe: erodes easily.	Slight.
GrB, GrC: Graybert	Slight	Slight	Moderate: slope.	Severe: erodes easily.	Slight.
Ha: Hall	Slight	Slight	Slight	Slight	Slight.
HaB: Hall	Slight	Slight	Moderate: slope.	Slight	Slight.
HeB: Hersh	Slight	Slight	Slight	Slight	Slight.
HeC: Hersh	Slight	Slight	Moderate: slope.	Slight	Slight.
HeD, HeE: Hersh	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
HhF*:					
Hersh	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Valentine	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Hk Hobbs	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
Hm Hobbs	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
HoB, HoC, HoC2 Holdrege	Slight	Slight	Moderate: slope.	Slight	Slight.
HoD, HoD2 Holdrege	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
HpB Hord	Severe: flooding.	Slight	Slight	Slight	Slight.
Hr Hord	Slight	Slight	Slight	Slight	Slight.
HrB, HrC Hord	Slight	Slight	Moderate: slope.	Slight	Slight.
Ht Hord	Severe: flooding.	Slight	Slight	Slight	Slight.
HtB Hord	Severe: flooding.	Slight	Moderate: slope.	Slight	Slight.
InB Inavale	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding, droughty.
IpB Ipage	Slight	Slight	Slight	Slight	Moderate: droughty.
Ks Kenesaw	Slight	Slight	Slight	Slight	Slight.
KsB Kenesaw	Slight	Slight	Moderate: slope.	Slight	Slight.
Or Ord	Severe: flooding.	Moderate: wetness.	Moderate: wetness, flooding.	Moderate: wetness.	Moderate: wetness, droughty, flooding.
Ov Ovina	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Pg*. Pits					
Ru Rusco	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Sc Scott	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding, erodes easily.	Severe: ponding.
UbD, UbE Uly	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
UcF*:					
Uly	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Coly	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
VaB Valentine	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty.
VaD Valentine	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Moderate: droughty.
VaE, VaF Valentine	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Moderate: droughty, slope.
VbB Valentine	Slight	Slight	Slight	Slight	Moderate: droughty.
VbD Valentine	Slight	Slight	Severe: slope.	Slight	Moderate: droughty.
VbE Valentine	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: droughty, slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--WILDLIFE HABITAT POTENTIALS

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
AfB: Anselmo	Fair	Good	Good	Fair	Fair	Fair	Very poor.	Very poor.	Good	Good	Very poor.	Good.
An: Anselmo	Good	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	Good.
AnC: Anselmo	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	Good.
Ao: Anselmo	Good	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	Good.
AoB: Anselmo	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	Good.
Ba: Barney	Very poor.	Poor	Fair	Poor	Poor	Fair	Good	Good	Poor	Poor	Good	Fair.
Bn: Barney Variant	Very poor.	Poor	Fair	Poor	Poor	Poor	Good	Good	Poor	Poor	Good	Poor.
Bo, Bp, BxB*: Boel	Fair	Fair	Good	Good	Good	Good	Fair	Fair	Fair	Good	Poor	Fair.
Ca: Cass	Good	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	Good.
CoD2*:												
Coly	Fair	Good	Good	Good	Fair	Fair	Poor	Very poor.	Fair	Good	Very poor.	Fair.
Uly	Fair	Good	Good	Good	Fair	Fair	Poor	Very poor.	Fair	Good	Very poor.	Fair.
CoF2*:												
Coly	Poor	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.	Fair.
Uly	Poor	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Fair	Good	Very poor.	Fair.
CrG*:												
Coly	Very poor.	Very poor.	Poor	Poor	Poor	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.	Fair.
Hobbs	Good	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor	Good.
Cs, Cz, CzB: Cozad	Good	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	Good.
CsC: Cozad	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	Good.
DuB: Dunday	Fair	Good	Good	Fair	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.	Good.
EcB: Els	Poor	Poor	Fair	Fair	Fair	Fair	Fair	Fair	Poor	Fair	Fair	Fair.
Fm: Fillmore Variant	Fair	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good	Fair.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
Ga: Gannett	Very poor.	Poor	Fair	Poor	Poor	Fair	Good	Good	Poor	Poor	Good	Fair.
Gb*:												
Gannett	Very poor.	Poor	Fair	Poor	Poor	Fair	Good	Good	Poor	Poor	Good	Fair.
Loup	Very poor.	Poor	Fair	Poor	Poor	Fair	Good	Good	Poor	Poor	Good	Fair.
GfC, GfD: Gates	Fair	Good	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.	Fair.
GfE, GfF: Gates	Poor	Good	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.	Fair.
GhG*:												
Gates	Poor	Good	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.	Fair.
Hersh	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Fair.
Gk: Gibbon	Good	Good	Good	Good	Fair	Good	Fair	Good	Good	Good	Fair	Good.
Gr, GrB: Graybert	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.	Good.
GrC: Graybert	Fair	Good	Good	Good	Good	Fair	Poor	Very poor.	Good	Good	Very poor.	Fair.
Ha, HaB: Hall	Good	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	Good.
HeB, HeC, HeD: Hersh	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	Good.
HeE: Hersh	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Fair.
HhF*:												
Hersh	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Fair.
Valentine	Very poor.	Very poor.	Fair	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.	Fair.
Hk: Hobbs	Good	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor	Good.
Hm: Hobbs	Poor	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.	Fair.
HoB: Holdrege	Good	Good	Fair	Good	Fair	Fair	Very poor.	Very poor.	Good	Good	Very poor.	Fair.
HoC, HoC2, HoD, HoD2: Holdrege	Fair	Good	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Good	Very poor.	Fair.
HpB, Hr, HrB: Hord	Good	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	Good.
HrC: Hord	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	Good.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
Ht, HtB-------------- Hord	Good	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	Good.
InB------------------ Inavale	Fair	Fair	Good	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.	Good.
IpB------------------ Ipage	Poor	Good	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair.
Ks, KsB-------------- Kenesaw	Good	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	Good.
Or------------------- Ord	Good	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair	Good.
Ov------------------- Ovina	Good	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair	Good.
Pg*. Pits												
Ru------------------- Rusco	Good	Good	Good	Good	Good	Good	Poor	Fair	Fair	Good	Poor	Fair.
Sc------------------- Scott	Poor	Fair	Fair	Poor	Poor	Poor	Good	Good	Fair	---	Good	Fair.
UbD------------------ Uly	Fair	Good	Good	Good	Fair	Fair	Very poor.	Very poor.	Fair	Good	Very poor.	Good.
UbE------------------ Uly	Poor	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Poor	Good	Very poor.	Fair.
UcF*:												
Uly-----------------	Poor	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Poor	Good	Very poor.	Fair.
Coly----------------	Poor	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.	Fair.
VaB, VaD, VaE, VaF Valentine	Poor	Fair	Fair	Poor	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.	Fair.
VbB------------------ Valentine	Fair	Good	Fair	Poor	Fair	Fair	Very poor.	Very poor.	Fair	Poor	Very poor.	Fair.
VbD, VbE------------- Valentine	Poor	Fair	Fair	Poor	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.	Fair.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AfB, An----------- Anselmo	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Moderate: frost action.	Slight.
AnC--------------- Anselmo	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Moderate: frost action.	Slight.
Ao, AoB----------- Anselmo	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Moderate: frost action.	Slight.
Ba---------------- Barney	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
Bn---------------- Barney Variant	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.
Bo, Bp------------ Boel	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Moderate: wetness, droughty, flooding.
BxB*-------------- Boel	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.
Ca---------------- Cass	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, frost action.	Slight.
CoD2*:						
Coly--------------	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
Uly---------------	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
CoF2*:						
Coly--------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Uly---------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
CrG*:						
Coly--------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Hobbs-------------	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Moderate: flooding.
Cs---------------- Cozad	Slight---------	Slight---------	Slight---------	Slight---------	Moderate: frost action.	Slight.
CsC--------------- Cozad	Slight---------	Slight---------	Slight---------	Moderate: slope.	Moderate: frost action.	Slight.
Cz, CzB----------- Cozad	Slight---------	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, frost action.	Slight.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
DuB: Dunday	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Moderate: droughty.
EcB: Els	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, frost action.	Moderate: wetness, droughty.
Fm: Fillmore Variant	Severe: ponding.	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: ponding.
Ga: Gannett	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, frost action.	Severe: ponding.
Gb*:						
Gannett	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding, frost action.	Severe: wetness.
Loup	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness.
GfC: Gates	Slight	Slight	Slight	Moderate: slope.	Moderate: frost action.	Slight.
GfD, GfE: Gates	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
GfF: Gates	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
GhG*:						
Gates	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Hersh	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Gk: Gibbon	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding, frost action.	Moderate: wetness, flooding.
Gr, GrB: Graybert	Slight	Slight	Slight	Slight	Moderate: frost action.	Slight.
GrC: Graybert	Slight	Slight	Slight	Moderate: slope.	Moderate: frost action.	Slight.
Ha, HaB: Hall	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
HeB: Hersh	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.	Slight.
HeC: Hersh	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Moderate: frost action.	Slight.
HeD, HeE: Hersh	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
HhF*:						
Hersh	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Valentine	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Hk: Hobbs	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength,	Moderate: flooding.
Hm: Hobbs	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Severe: flooding.
HoB: Holdrege	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
HoC, HoC2: Holdrege	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
HoD, HoD2: Holdrege	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
HpB: Hord	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength.	Slight.
Hr, HrB: Hord	Slight	Slight	Slight	Slight	Severe: low strength.	Slight.
HrC: Hord	Slight	Slight	Slight	Moderate: slope.	Severe: low strength.	Slight.
Ht, HtB: Hord	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength.	Slight.
InB: Inavale	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, droughty.
IpB: Ipage	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Moderate: frost action.	Moderate: droughty.
Ks, KsB: Kenesaw	Slight	Slight	Slight	Slight	Moderate: low strength, frost action.	Slight.
Or: Ord	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding, frost action.	Moderate: wetness, droughty, flooding.
Ov: Ovina	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: frost action.	Moderate: wetness.
Pg*. Pits						
Ru: Rusco	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, frost action.	Severe: ponding.
Sc: Scott	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: low strength, ponding, frost action.	Severe: ponding.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
UbD, UbE: Uly	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
UcF*:						
Uly	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Coly	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
VaB: Valentine	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Moderate: droughty.
VaD: Valentine	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
VaE, VaF: Valentine	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
VbB: Valentine	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Moderate: droughty.
VbD: Valentine	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
VbE: Valentine	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AfB, An, AnC, Ao, AoB: Anselmo	Slight	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Fair: too sandy.
Ba: Barney	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.
Bn: Barney Variant	Severe: flooding, ponding.	Severe: seepage, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Poor: thin layer.
Bo, Bp, BxB*: Boel	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy.
Ca: Cass	Slight	Severe: seepage, flooding.	Severe: seepage.	Severe: seepage.	Fair: thin layer.
CoD2*:					
Coly	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
Uly	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
CoF2*:					
Coly	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Uly	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
CrG*:					
Coly	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Hobbs	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Fair: too clayey.
Cs: Cozad	Slight	Moderate: seepage.	Slight	Slight	Good.
CsC: Cozad	Slight	Moderate: seepage, slope.	Slight	Slight	Good.
Cz, CzB: Cozad	Moderate: flooding.	Moderate: seepage.	Moderate: flooding.	Moderate: flooding.	Good.
DuB: Dunday	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
EcB: Els	Severe: wetness, poor filter.	Severe: wetness, seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Fm: Fillmore Variant	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
Ga: Gannett	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
Gb*:					
Gannett	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.
Loup	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.
GfC: Gates	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
GfD, GfE: Gates	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: slope.
GfF: Gates	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
GhG*:					
Gates	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
Hersh	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
Gk: Gibbon	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Fair: wetness.
Gr: Graybert	Slight	Moderate: seepage.	Slight	Slight	Good.
GrB, GrC: Graybert	Slight	Moderate: seepage, slope.	Slight	Slight	Good.
Ha, HaB: Hall	Slight	Severe: seepage.	Severe: seepage.	Slight	Fair: too clayey.
HeB, HeC: Hersh	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too sandy.
HeD, HeE: Hersh	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: too sandy, slope.
HhF*:					
Hersh	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
HhF*:					
Valentine	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.
Hk, Hm Hobbs	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Fair: flooding.
HoB, HoC, HoC2 Holdrege	Slight	Moderate: seepage, slope.	Slight	Slight	Good.
HoD, HoD2 Holdrege	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
HpB Hord	Moderate: flooding.	Moderate: seepage.	Moderate: flooding.	Moderate: flooding.	Good.
Hr Hord	Slight	Moderate: seepage.	Slight	Slight	Good.
HrB, HrC Hord	Slight	Moderate: seepage, slope.	Slight	Slight	Good.
Ht Hord	Moderate: flooding.	Moderate: seepage.	Moderate: flooding.	Moderate: flooding.	Good.
HtB Hord	Moderate: flooding.	Moderate: seepage, slope.	Moderate: flooding.	Moderate: flooding.	Good.
InB Inavale	Severe: flooding, poor filter.	Severe: seepage, flooding.	Severe: seepage, too sandy, flooding.	Severe: seepage, flooding.	Poor: too sandy, seepage.
IpB Ipage	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
Ks Kenesaw	Slight	Moderate: seepage.	Slight	Slight	Good.
KsB Kenesaw	Slight	Moderate: seepage, slope.	Slight	Slight	Good.
Or Ord	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy.
Ov Ovina	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: wetness.
Pg*. Pits					
Ru Rusco	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Sc: Scott	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
UbD, UbE: Uly	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
UcF*:					
Uly	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Coly	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
VaB, VaD: Valentine	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
VaE, VaF: Valentine	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
VbB, VbD: Valentine	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
VbE: Valentine	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," "probable," and "improbable." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
AfB------------------- Anselmo	Good	Probable	Improbable: too sandy.	Fair: too sandy, thin layer.
An, AnC, Ao, AoB------ Anselmo	Good	Probable	Improbable: too sandy.	Fair: thin layer.
Ba-------------------- Barney	Poor: wetness.	Probable	Improbable: too sandy.	Poor: thin layer, wetness.
Bn-------------------- Barney Variant	Poor: wetness.	Probable	Improbable: too sandy.	Poor: thin layer, wetness.
Bo-------------------- Boel	Fair: wetness.	Probable	Improbable: too sandy.	Fair: too sandy.
Bp-------------------- Boel	Fair: wetness.	Probable	Improbable: too sandy.	Fair: thin layer.
BxB*------------------ Boel	Fair: wetness.	Probable	Improbable: too sandy.	Poor: thin layer, flooding.
Ca-------------------- Cass	Good	Probable	Improbable: too sandy.	Good.
CoD2*:				
Coly	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
Uly	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
CoF2*:				
Coly	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Uly	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
CrG*:				
Coly	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Hobbs	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Cs, CsC--------------- Cozad	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
Cz, CzB--------------- Cozad	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
DuB------------------- Dunday	Good	Probable	Improbable: too sandy.	Poor: thin layer.
EcB------------------- Els	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
Fm-------------------- Fillmore Variant	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Ga------------------- Gannett	Poor: wetness.	Probable	Improbable: too sandy.	Poor: wetness.
Gb*:				
Gannett	Poor: wetness.	Probable	Improbable: too sandy.	Poor: wetness.
Loup	Poor: wetness.	Probable	Improbable: too sandy.	Poor: thin layer, wetness.
GfC Gates	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
GfD, GfE Gates	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
GfF Gates	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
GhG*:				
Gates	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Hersh	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Gk Gibbon	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
Gr, GrB, GrC Graybert	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
Ha, HaB Hall	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
HeB, HeC Hersh	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
HeD, HeE Hersh	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
HhF*:				
Hersh	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Valentine	Fair: slope.	Probable	Improbable: too sandy.	Poor: slope.
Hk, Hm Hobbs	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
HoB, HoC, HoC2 Holdrege	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
HoD, HoD2 Holdrege	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
HpB, Hr, HrB, HrC, Ht, HtB Hord	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
InB Inavale	Good	Probable	Improbable: too sandy.	Poor: too sandy.
IpB Ipage	Good	Probable	Improbable: too sandy.	Fair: too sandy.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Ks, KsB: Kenesaw	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Or: Ord	Fair: wetness.	Probable	Improbable: too sandy.	Fair: thin layer.
Ov: Ovina	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
Pg*. Pits				
Ru: Rusco	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Sc: Scott	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
UbD, UbE: Uly	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
UcF*:				
Uly	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Coly	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
VaB, VaD, VaE, VaF: Valentine	Good	Probable	Improbable: too sandy.	Poor: too sandy.
VbB, VbD: Valentine	Good	Probable	Improbable: too sandy.	Fair: too sandy.
VbE: Valentine	Good	Probable	Improbable: too sandy.	Fair: too sandy, slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated]

Soil name and map symbol	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
AfB: Anselmo	Severe: seepage.	Severe: seepage, piping.	Deep to water	Soil blowing, fast intake.	Too sandy, soil blowing.	Favorable.
An: Anselmo	Severe: seepage.	Severe: seepage, piping.	Deep to water	Soil blowing	Too sandy, soil blowing.	Favorable.
AnC: Anselmo	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope	Too sandy, soil blowing.	Favorable.
Ao, AoB: Anselmo	Severe: seepage.	Severe: seepage, piping.	Deep to water	Soil blowing	Too sandy, soil blowing.	Favorable.
Ba: Barney	Severe: seepage.	Severe: seepage, piping, wetness.	Flooding, cutbanks cave	Wetness, droughty.	Wetness, too sandy, soil blowing.	Wetness, droughty, rooting depth.
Bn: Barney Variant	Severe: seepage.	Severe: piping, wetness.	Flooding	Flooding	Wetness	Wetness.
Bo: Boel	Severe: seepage.	Severe: seepage, piping, wetness.	Flooding, cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Droughty, rooting depth.
Bp: Boel	Severe: seepage.	Severe: seepage, piping, wetness.	Flooding, cutbanks cave	Wetness, droughty.	Wetness, too sandy, soil blowing.	Droughty, rooting depth.
BxB*: Boel	Severe: seepage.	Severe: seepage, piping, wetness.	Flooding, cutbanks cave	Flooding, wetness.	Wetness, too sandy, soil blowing.	Droughty, rooting depth.
Ca: Cass	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing	Soil blowing	Favorable.
CoD2*, CoF2*:						
Coly	Severe: slope.	Severe: piping.	Deep to water	Slope, erodes easily	Slope, erodes easily	Slope, erodes easily.
Uly	Severe: slope.	Severe: piping.	Deep to water	Slope, erodes easily	Slope, erodes easily	Slope, erodes easily.
CrG*:						
Coly	Severe: slope.	Severe: piping.	Deep to water	Slope, erodes easily	Slope, erodes easily	Slope, erodes easily
Hobbs	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope, flooding.	Favorable	Favorable.
Cs: Cozad	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Erodes easily	Erodes easily.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
CsC: Cozad	Moderate: seepage,	Severe: piping.	Deep to water	Favorable	Erodes easily	Erodes easily.
Cz, CzB: Cozad	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Erodes easily	Erodes easily.
DuB: Dunday	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
EcB: Els	Severe: seepage.	Severe: seepage, piping, wetness.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Droughty, rooting depth.
Fm: Fillmore Variant	Moderate: seepage.	Severe: piping, ponding.	Ponding, frost action, percs slowly.	Ponding, percs slowly, erodes easily	Erodes easily, ponding.	Wetness, erodes easily.
Ga: Gannett	Severe: seepage.	Severe: seepage, piping, ponding.	Ponding, frost action, cutbanks cave	Ponding, droughty.	Ponding, too sandy.	Wetness, droughty.
Gb*:						
Gannett	Severe: seepage.	Severe: seepage, piping, wetness.	Flooding, frost action, cutbanks cave	Wetness, droughty, flooding.	Wetness, too sandy.	Wetness, droughty.
Loup	Severe: seepage.	Severe: seepage, piping, wetness.	Flooding, cutbanks cave	Wetness	Wetness, too sandy.	Wetness.
GfC: Gates	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, slope, erodes easily	Erodes easily, soil blowing.	Erodes easily.
GfD, GfE, GfF: Gates	Severe: seepage, slope.	Severe: piping.	Deep to water	Soil blowing, slope, erodes easily	Slope, erodes easily soil blowing.	Slope, erodes easily.
GhG*:						
Gates	Severe: seepage, slope.	Severe: piping.	Deep to water	Soil blowing, slope, erodes easily	Slope, erodes easily soil blowing.	Slope, erodes easily.
Hersh	Severe: seepage, slope.	Severe: piping.	Deep to water	Soil blowing, slope.	Slope, soil blowing.	Slope.
Gk: Gibbon	Severe: seepage.	Severe: piping, wetness.	Flooding, frost action.	Wetness, flooding.	Wetness	Favorable.
Gr, GrB: Graybert	Moderate: seepage.	Severe: piping.	Deep to water	Soil blowing, erodes easily	Erodes easily, soil blowing.	Erodes easily.
GrC: Graybert	Moderate: seepage, slope.	Severe: piping.	Deep to water	Soil blowing, slope, erodes easily	Erodes easily, soil blowing.	Erodes easily.
Ha, HaB: Hall	Moderate: seepage.	Moderate: thin layer.	Deep to water	Favorable	Erodes easily	Erodes easily.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
HeB---------------- Hersh	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing	Soil blowing	Favorable.
HeC---------------- Hersh	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, slope.	Soil blowing	Favorable.
HeD, HeE---------- Hersh	Severe: seepage, slope.	Severe: piping.	Deep to water	Soil blowing, slope.	Slope, soil blowing.	Slope.
HhF*:						
Hersh-------------	Severe: seepage, slope.	Severe: piping.	Deep to water	Soil blowing, slope.	Slope, soil blowing.	Slope.
Valentine---------	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Slope, too sandy, soil blowing.	Slope, droughty.
Hk, Hm------------ Hobbs	Moderate: seepage.	Severe: piping.	Deep to water	Flooding------	Favorable-----	Favorable.
HoB---------------- Holdrege	Moderate: seepage.	Severe: piping.	Deep to water	Favorable-----	Erodes easily	Erodes easily.
HoC, HoC2--------- Holdrege	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope----------	Erodes easily	Erodes easily.
HoD, HoD2--------- Holdrege	Severe: slope.	Severe: piping.	Deep to water	Slope----------	Slope, erodes easily	Slope, erodes easily.
HpB---------------- Hord	Moderate: seepage.	Moderate: piping.	Deep to water	Soil blowing	Soil blowing	Favorable.
Hr, HrB----------- Hord	Moderate: seepage.	Moderate: piping.	Deep to water	Favorable-----	Favorable-----	Favorable.
HrC---------------- Hord	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope----------	Favorable-----	Favorable.
Ht, HtB----------- Hord	Moderate: seepage.	Moderate: piping.	Deep to water	Favorable-----	Favorable-----	Favorable.
InB---------------- Inavale	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
IpB---------------- Ipage	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
Ks, KsB----------- Kenesaw	Moderate: seepage.	Severe: piping.	Deep to water	Favorable-----	Erodes easily	Erodes easily.
Or----------------- Ord	Severe: seepage.	Severe: seepage, piping, wetness.	Flooding, frost action, cutbanks cave	Wetness, droughty, soil blowing.	Wetness, too sandy, soil blowing.	Droughty.
Ov----------------- Ovina	Severe: seepage.	Severe: piping, wetness.	Frost action	Wetness--------	Wetness--------	Wetness.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
Pg*. Pits						
Ru------------------ Rusco	Moderate: seepage.	Severe: piping, ponding.	Ponding, frost action.	Ponding-------	Erodes easily, ponding.	Wetness, erodes easily.
Sc------------------ Scott	Moderate: seepage.	Severe: hard to pack, ponding.	Ponding, percs slowly, frost action.	Ponding, percs slowly, erodes easily	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
UbD, UbE---------- Uly	Severe: slope.	Severe: piping.	Deep to water	Slope----------	Slope, erodes easily	Slope, erodes easily.
UcF*:						
Uly---------------	Severe: slope.	Severe: piping.	Deep to water	Slope----------	Slope, erodes easily	Slope, erodes easily.
Coly--------------	Severe: slope.	Severe: piping.	Deep to water	Slope, erodes easily	Slope, erodes easily	Slope, erodes easily.
VaB, VaD---------- Valentine	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
VaE, VaF---------- Valentine	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Slope, too sandy, soil blowing.	Slope, droughty.
VbB, VbD---------- Valentine	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
VbE---------------- Valentine	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Slope, too sandy, soil blowing.	Slope, droughty.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
AfB---------------- Anselmo	0-10	Loamy fine sand	SM	A-2	0	100	90-100	65-85	15-30	---	NP
	10-21	Fine sandy loam, loam.	SM, ML, SM-SC, CL-ML	A-4	0	100	100	90-100	35-65	<24	NP-5
	21-60	Fine sandy loam, loamy fine sand, fine sand.	SM, SP-SM	A-4, A-2	0	100	100	65-100	12-40	<20	NP
An, AnC----------- Anselmo	0-10	Fine sandy loam	SM, ML, SM-SC, CL-ML	A-4, A-2	0	100	100	60-100	30-65	<20	NP-5
	10-22	Fine sandy loam, loam.	SM, ML, SM-SC, CL-ML	A-4	0	100	100	90-100	35-65	<24	NP-5
	22-60	Fine sandy loam, loamy fine sand, fine sand.	SM, SP-SM	A-4, A-2	0	100	100	65-100	12-40	<20	NP
Ao, AoB----------- Anselmo	0-10	Very fine sandy loam.	SM, ML, SM-SC, CL-ML	A-4, A-2	0	100	100	60-100	30-65	<20	NP-5
	10-22	Very fine sandy loam, fine sandy loam, loam.	SM, ML, SM-SC, CL-ML	A-4	0	100	100	90-100	35-65	<24	NP-5
	22-60	Fine sandy loam, loamy fine sand, fine sand.	SM, SP-SM	A-4, A-2	0	100	100	65-100	12-40	<20	NP
Ba---------------- Barney	0-7	Fine sandy loam	SM, ML, CL-ML, SM-SC	A-2, A-4	0	90-100	90-100	60-95	30-70	18-30	NP-7
	7-14	Stratified loam to fine sand.	SM, ML	A-2, A-4	0	90-100	90-100	55-80	20-60	---	NP
	14-60	Coarse sand, sand, fine sand.	SP, SM, SP-SM	A-1, A-2, A-3	0	90-100	85-100	30-70	3-15	---	NP
Bn---------------- Barney Variant	0-14	Loam--------------	ML, CL	A-4, A-6	0	100	100	85-95	60-75	<30	NP-15
	14-60	Fine sand, very fine sandy loam.	SM, SP-SM	A-2, A-4	0	90-100	85-100	30-70	20-60	<30	NP-10
Bo---------------- Boel	0-16	Loamy fine sand	SM, SP	A-2, A-3	0	100	95-100	85-95	0-35	---	NP
	16-60	Fine sand, loamy fine sand, coarse sand.	SP, SM	A-2, A-3	0	100	95-100	85-95	0-25	---	NP
Bp---------------- Boel	0-16	Fine sandy loam	SM	A-4, A-2	0	100	100	85-95	20-40	<20	NP
	16-60	Fine sand, loamy fine sand, coarse sand.	SP, SM	A-2, A-3	0	100	95-100	85-95	0-25	---	NP
BxB*-------------- Boel	0-16	Loamy fine sand	SM, SP	A-2, A-3	0	100	95-100	65-85	15-30	---	NP
	16-60	Fine sand, loamy fine sand, coarse sand.	SP, SM	A-2, A-3	0	100	95-100	85-95	0-25	---	NP
Ca---------------- Cass	0-15	Fine sandy loam	SM, SM-SC	A-4, A-2	0	100	95-100	85-95	20-40	<20	NP-5
	15-35	Fine sandy loam, sandy loam, very fine sandy loam.	SM, SM-SC	A-4, A-2	0	100	95-100	85-95	20-50	<20	NP-5
	35-60	Loamy fine sand, fine sand, coarse sand.	SM, SP-SM	A-2, A-3	0	95-100	95-100	50-75	5-30	---	NP

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
CoD2*, CoF2*:											
Coly------------	0-4	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	100	100	85-100	85-100	20-40	2-15
	4-60	Silt loam, very fine sandy loam, loam.	ML, CL, CL-ML	A-4	0	100	100	85-100	85-100	20-35	2-10
Uly-------------	0-6	Silt loam--------	ML, CL	A-4, A-6	0	100	100	100	95-100	25-40	2-15
	6-19	Silt loam, silty clay loam.	ML, CL	A-4, A-6	0	100	100	100	95-100	25-40	3-15
	19-60	Silt loam, very fine sandy loam.	CL, ML	A-4, A-6	0	100	100	100	95-100	25-40	3-15
CrG*:											
Coly------------	0-4	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	100	100	85-100	85-100	20-40	2-15
	4-60	Silt loam, very fine sandy loam, loam.	ML, CL, CL-ML	A-4	0	100	100	85-100	85-100	20-35	2-10
Hobbs-----------	0-8	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	95-100	85-100	25-40	5-20
	8-60	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	95-100	80-100	25-40	5-20
Cs, CsC---------- Cozad	0-12	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	100	100	100	75-100	20-35	2-12
	12-22	Silt loam, very fine sandy loam.	ML, CL, CL-ML	A-4, A-6	0	95-100	95-100	90-100	80-95	20-35	2-12
	22-60	Sand, loam, very fine sandy loam.	Sm, ML	A-4, A-6	0	95-100	95-100	80-100	50-95	20-35	2-12
Cz, CzB---------- Cozad	0-12	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	100	100	100	75-100	20-35	2-12
	12-22	Silt loam, very fine sandy loam.	ML, CL, CL-ML	A-4, A-6	0	95-100	95-100	90-100	80-95	20-35	2-12
	22-60	Silt loam, very fine sandy loam, fine sandy loam.	ML, CL, CL-ML	A-4, A-6	0	95-100	95-100	80-100	50-95	20-35	2-12
DuB------------- Dunday	0-19	Loamy fine sand	SM, SM-SC	A-2	0	100	100	90-100	13-35	<25	NP-4
	19-60	Loamy fine sand, fine sand, loamy sand.	SM, SP-SM, SM-SC	A-2, A-3	0	100	100	50-95	5-35	<25	NP-4
EcB-------------- Els	0-6	Fine sand--------	SP-SM, SM	A-2, A-3	0	100	100	70-100	5-35	---	NP
	6-60	Fine sand, loamy sand.	SP-SM, SM	A-2, A-3	0	90-100	90-100	70-100	5-30	---	NP
Fm--------------- Fillmore Variant	0-7	Silt loam--------	ML, CL-ML, CL	A-4	0	100	100	100	95-100	20-30	2-8
	7-42	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6	0	100	100	100	95-100	20-40	2-15
	42-57	Silt loam--------	ML, CL-ML, CL	A-4	0	100	100	100	95-100	20-30	2-8
	57-60	Silty clay-------	CH	A-7	0	100	100	100	95-100	60-75	30-45
Ga--------------- Gannett	0-20	Loam-------------	ML, CL-ML, CL	A-4, A-6	0	100	100	95-100	50-65	25-35	3-13
	20-60	Fine sand, loamy sand, sand.	SP-SM, SM	A-3, A-2	0	100	100	90-100	5-15	<20	NP
Gb*:											
Gannett---------	0-20	Loam-------------	ML, CL-ML, CL	A-4, A-6	0	100	100	95-100	50-65	25-35	3-13
	20-60	Fine sand, loamy sand, sand.	SP-SM, SM	A-3, A-2	0	100	100	90-100	5-15	---	NP
Loup------------	0-12	Loam-------------	CL, CL-ML	A-4, A-6	0	100	100	90-100	55-80	15-35	4-15
	12-60	Fine sand, loamy sand, sand.	SP-SM, SM	A-2, A-3	0	100	100	65-100	5-20	---	NP

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
GfC, GfD, GfE, GfF: Gates	0-5	Very fine sandy loam.	ML	A-4	0	100	100	95-100	65-100	20-40	NP-10
	5-18	Very fine sandy loam.	ML	A-4	0	100	100	95-100	65-100	20-40	NP-10
	18-60	Very fine sandy loam, silt loam, loamy very fine sand.	ML, SM	A-4	0	100	100	95-100	35-100	20-40	NP-10
GhG*: Gates	0-5	Very fine sandy loam.	ML	A-4	0	100	100	95-100	65-100	20-40	NP-10
	5-18	Very fine sandy loam.	ML	A-4	0	100	100	95-100	65-100	20-40	NP-10
	18-60	Very fine sandy loam, silt loam, loamy very fine sand.	ML, SM	A-4	0	100	100	95-100	35-100	20-40	NP-10
Hersh	0-5	Fine sandy loam	SM, SC, SM-SC, ML	A-4	0	100	100	85-100	40-75	<20	NP-10
	5-10	Fine sandy loam, loamy very fine sand.	SM, SM-SC, ML, CL-ML	A-4	0	100	100	80-100	40-65	<20	NP-5
	10-60	Fine sandy loam, loamy fine sand, loamy very fine sand.	SM, SM-SC	A-4	0	100	100	80-100	35-50	<20	NP-5
Gk: Gibbon	0-10	Silt loam	ML, CL, CL-ML	A-4	0	100	100	85-100	70-90	20-30	2-10
	10-33	Silt loam, clay loam.	CL	A-6	0	100	100	90-100	55-90	25-38	12-20
	33-60	Stratified fine sandy loam to silt loam.	SM, SC, CL, ML	A-4	0	100	100	70-95	35-90	<25	NP-8
Gr, GrB, GrC: Graybert	0-10	Very fine sandy loam.	ML, CL-ML	A-4	0	100	100	85-95	65-85	22-35	2-10
	10-24	Very fine sandy loam, loam.	ML, CL-ML	A-4	0	100	100	90-100	70-90	22-35	2-10
	24-38	Silt loam	ML, CL-ML	A-4	0	100	100	90-100	70-90	22-35	2-10
	38-60	Silt loam	ML, CL-ML	A-4	0	100	100	90-100	70-90	22-35	2-10
Ha, HaB: Hall	0-17	Silt loam	CL, CL-ML, ML	A-4, A-6	0	100	100	95-100	95-100	25-40	3-20
	17-28	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	95-100	35-50	15-30
	28-60	Silt loam, silty clay loam.	CL	A-6, A-4	0	100	100	95-100	90-100	25-40	5-20
HeB, HeC, HeD, HeE: Hersh	0-5	Fine sandy loam	SM, SC, SM-SC, ML	A-4	0	100	100	85-100	40-75	<20	NP-10
	5-10	Fine sandy loam, loamy very fine sand.	SM, SM-SC, ML, CL-ML	A-4	0	100	100	80-100	40-65	<20	NP-5
	10-60	Fine sandy loam, loamy fine sand, loamy very fine sand.	SM, SM-SC	A-4	0	100	100	80-100	35-50	<20	NP-5

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
HhF*:											
Hersh-----------	0-5	Fine sandy loam	SM, SC, SM-SC, ML	A-4	0	100	100	85-100	40-75	<20	NP-10
	5-10	Fine sandy loam, loamy very fine sand.	SM, SM-SC, ML, CL-ML	A-4	0	100	100	80-100	40-65	<20	NP-5
	10-60	Fine sandy loam, loamy fine sand, loamy very fine sand.	SM, SM-SC	A-4	0	100	100	80-100	35-50	<20	NP-5
Valentine-------	0-6	Loamy fine sand	SM, SP-SM, SP	A-2, A-3	0	100	100	95-100	2-35	---	NP
	6-60	Fine sand, loamy fine sand.	SM, SP-SM, SP	A-2, A-3	0	100	100	90-100	2-20	---	NP
Hk, Hm----------- Hobbs	0-6	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	95-100	85-100	25-40	5-20
	6-60	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	95-100	80-100	25-40	5-20
HoB, HoC--------- Holdrege	0-10	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	100	100	95-100	90-100	20-40	2-18
	10-32	Silty clay loam	CL	A-7, A-6	0	100	100	98-100	95-100	30-50	15-35
	32-60	Silt loam--------	CL, ML	A-4, A-6	0	100	100	95-100	90-100	30-40	5-15
HoC2------------- Holdrege	0-6	Silty clay loam	CL	A-7, A-6	0	100	100	95-100	95-100	30-50	15-35
	6-25	Silty clay loam	CL	A-7, A-6	0	100	100	98-100	95-100	30-50	15-35
	25-60	Silt loam--------	CL, ML	A-4, A-6	0	100	100	95-100	90-100	30-40	5-15
HoD-------------- Holdrege	0-7	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	100	100	95-100	90-100	20-40	2-18
	7-31	Silty clay loam	CL	A-7, A-6	0	100	100	98-100	95-100	30-50	15-35
	31-60	Silt loam--------	CL, ML	A-4, A-6	0	100	100	95-100	90-100	30-40	5-15
HoD2------------- Holdrege	0-5	Silty clay loam	CL	A-7, A-6	0	100	100	95-100	95-100	30-50	15-35
	5-23	Silty clay loam	CL	A-7, A-6	0	100	100	98-100	95-100	30-50	15-35
	23-60	Silt loam--------	CL, ML	A-4, A-6	0	100	100	95-100	90-100	30-40	5-15
HpB-------------- Hord	0-21	Fine sandy loam	SM, SM-SC, ML, CL-ML	A-4	0	100	100	70-100	40-55	<25	NP-5
	21-32	Silt loam, silty clay loam, loam.	CL	A-6, A-4	0	100	100	98-100	85-100	25-40	8-23
	32-60	Silt loam, very fine sandy loam, silty clay loam.	CL, CL-ML	A-6, A-4	0	100	100	100	85-100	25-40	6-21
Hr, HrB, HrC, Ht, HtB-------------- Hord	0-17	Silt loam--------	CL, ML, CL-ML	A-4, A-6	0	100	100	95-100	85-100	20-35	3-18
	17-45	Silt loam, silty clay loam, loam.	CL	A-6, A-4	0	100	100	98-100	85-100	25-40	8-23
	45-60	Silt loam, very fine sandy loam, silty clay loam.	CL, CL-ML	A-6, A-4	0	100	100	100	85-100	25-40	6-21
InB-------------- Inavale	0-6	Loamy fine sand	SM, SP-SM, SM-SC	A-2, A-3	0	100	100	85-95	5-35	<25	NP-5
	6-24	Fine sand, loamy fine sand, loamy sand.	SP-SM, SM, SM-SC	A-2, A-3	0	100	90-100	65-85	5-30	<25	NP-5
	24-60	Fine sand, loamy fine sand, loamy sand.	SP-SM, SM, SM-SC	A-2, A-3	0	100	100	70-90	5-30	<25	NP-5
IpB-------------- Ipage	0-12	Loamy fine sand	SM	A-2	0	100	100	50-75	15-35	---	NP
	12-60	Fine sand, loamy sand, sand.	SM, SP-SM	A-2, A-3	0	100	100	50-70	5-30	---	NP

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Ks, KsB---------- Kenesaw	0-10	Very fine sandy loam.	ML, CL, CL-ML	A-4, A-6	0	100	100	95-100	85-100	20-35	2-12
	10-17	Loam, silt loam, very fine sandy loam.	ML, CL, CL-ML	A-4, A-6	0	100	100	90-100	85-100	18-35	2-13
	17-60	Silt loam, very fine sandy loam, loam.	ML, CL, CL-ML	A-4, A-6	0	100	100	95-100	80-100	20-35	2-12
Or--------------- Ord	0-10	Very fine sandy loam.	ML, SM	A-2, A-4	0	95-100	95-100	70-98	30-90	20-35	NP-10
	10-28	Fine sandy loam, loamy fine sand, sandy loam.	ML, SM	A-2, A-4	0	95-100	95-100	70-100	30-85	20-35	NP-10
	28-60	Stratified sand to fine sandy loam.	SM, SP-SM, SM-SC	A-2, A-3	0	95-100	95-100	50-100	5-30	<20	NP-5
Ov--------------- Ovina	0-19	Loam-------------	SM, ML	A-4	0	100	100	70-85	40-60	---	NP
	19-60	Fine sandy loam	SM, ML	A-4	0	100	100	70-85	40-60	---	NP
Pg*. Pits											
Ru--------------- Rusco	0-10	Silty clay loam	CL	A-6, A-7	0	100	100	90-100	80-100	30-45	15-30
	10-22	Silty clay loam	CL	A-6, A-7	0	100	100	90-100	85-100	30-45	15-30
	22-60	Loam, very fine sandy loam, silt loam.	ML, CL, CL-ML	A-4, A-6	0	95-100	95-100	90-100	70-100	20-35	3-15
Sc--------------- Scott	0-5	Silty clay loam	ML, CL, CL-ML	A-4, A-6, A-7	0	100	100	100	95-100	20-45	2-20
	5-40	Silty clay, clay	CH, CL	A-7	0	100	100	100	95-100	41-75	20-45
	40-49	Silty clay loam	CL, CH	A-7, A-6	0	100	100	100	95-100	35-60	20-40
	49-60	Silt loam, silty clay loam, clay loam.	CL	A-4, A-6, A-7	0	100	100	90-100	90-100	25-50	8-24
UbD, UbE--------- Uly	0-10	Silt loam--------	ML, CL	A-4, A-6	0	100	100	100	95-100	25-40	2-15
	10-25	Silt loam, silty clay loam.	ML, CL	A-4, A-6	0	100	100	100	95-100	25-40	3-15
	25-60	Silt loam, very fine sandy loam.	CL, ML	A-4, A-6	0	100	100	100	95-100	25-40	3-15
UcF*:											
Uly-------------	0-10	Silt loam--------	ML, CL	A-4, A-6	0	100	100	100	95-100	25-40	2-15
	10-25	Silt loam, silty clay loam.	ML, CL	A-4, A-6	0	100	100	100	95-100	25-40	3-15
	25-60	Silt loam, very fine sandy loam.	CL, ML	A-4, A-6	0	100	100	100	95-100	25-40	3-15
Coly------------	0-4	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	100	100	85-100	85-100	20-40	2-15
	4-60	Silt loam, very fine sandy loam, loam.	ML, CL, CL-ML	A-4	0	100	100	85-100	85-100	20-35	2-10
VaB, VaD, VaE, VaF------------- Valentine	0-6	Fine sand--------	SM, SP-SM, SP	A-2, A-3	0	100	100	70-100	2-25	---	NP
	6-60	Fine sand, loamy fine sand.	SM, SP-SM, SP	A-2, A-3	0	100	100	90-100	2-20	---	NP
VbB, VbD, VbE---- Valentine	0-6	Loamy fine sand	SM, SP-SM, SP	A-2, A-3	0	100	100	95-100	2-35	---	NP
	6-60	Fine sand, loamy fine sand.	SM, SP-SM, SP	A-2, A-3	0	100	100	90-100	2-20	---	NP

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	G/cm^3	In/hr	In/in	pH					Pct
AfB--------------- Anselmo	0-10	8-15	1.50-1.70	>6.0	0.10-0.12	6.1-7.8	Low-----------	0.17	5	2	1-2
	10-21	10-18	1.40-1.60	2.0-6.0	0.15-0.19	6.6-7.8	Low-----------	0.20			
	21-60	5-18	1.50-1.70	2.0-6.0	0.08-0.16	6.6-8.4	Low-----------	0.20			
An, AnC, Ao, AoB- Anselmo	0-10	10-18	1.30-1.60	0.6-6.0	0.13-0.18	6.1-7.8	Low-----------	0.20	5	3	1-2
	10-22	10-18	1.40-1.60	2.0-6.0	0.15-0.19	6.6-7.8	Low-----------	0.20			
	22-60	5-18	1.50-1.70	2.0-6.0	0.08-0.16	6.6-8.4	Low-----------	0.20			
Ba---------------- Barney	0-7	5-15	1.50-1.70	2.0-20	0.10-0.18	6.6-8.4	Low-----------	0.20	2	3	1-2
	7-14	3-10	1.60-1.80	2.0-20	0.09-0.14	7.4-8.4	Low-----------	0.17			
	14-60	0-5	1.50-1.70	6.0-20	0.02-0.04	6.6-7.8	Low-----------	0.10			
Bn---------------- Barney Variant	0-14	10-20	1.60-1.80	0.6-2.0	0.16-0.19	7.4-8.4	Low-----------	0.32	5	3	2-4
	14-60	6-18	1.40-1.60	2.0-6.0	0.08-0.16	7.4-8.4	Low-----------	0.24			
Bo---------------- Boel	0-16	2-10	1.60-1.80	6.0-20	0.10-0.12	6.6-8.4	Low-----------	0.17	5	2	1-2
	16-60	0-6	1.50-1.60	6.0-20	0.05-0.10	6.6-8.4	Low-----------	0.17			
Bp---------------- Boel	0-16	8-18	1.50-1.70	2.0-6.0	0.16-0.18	6.6-8.4	Low-----------	0.20	5	3	1-2
	16-60	0-6	1.50-1.60	6.0-20	0.05-0.10	6.6-8.4	Low-----------	0.17			
BxB*-------------- Boel	0-16	15-25	1.30-1.40	0.6-2.0	0.20-0.24	6.6-8.4	Low-----------	0.17	5	2	1-2
	16-60	0-6	1.50-1.60	6.0-20	0.05-0.10	6.6-8.4	Low-----------	0.17			
Ca---------------- Cass	0-15	7-17	1.40-1.60	2.0-6.0	0.16-0.18	6.1-7.3	Low-----------	0.20	5	3	1-2
	15-35	5-15	1.40-1.60	2.0-6.0	0.15-0.17	6.1-8.4	Low-----------	0.20			
	35-60	2-10	1.50-1.70	6.0-20	0.08-0.10	6.1-8.4	Low-----------	0.20			
CoD2*, CoF2*:											
Coly--------------	0-4	18-24	1.30-1.50	0.6-2.0	0.20-0.24	7.4-8.4	Low-----------	0.43	5	4L	.5-1
	4-60	18-24	1.30-1.50	0.6-2.0	0.17-0.22	7.4-8.4	Low-----------	0.43			
Uly---------------	0-6	17-27	1.20-1.30	0.6-2.0	0.20-0.24	6.1-7.8	Low-----------	0.32	5	4L	1-2
	6-19	20-32	1.20-1.30	0.6-2.0	0.18-0.22	6.1-8.4	Low-----------	0.43			
	19-60	18-24	1.10-1.20	0.6-2.0	0.18-0.22	7.4-8.4	Low-----------	0.43			
CrG*:											
Coly--------------	0-4	18-24	1.30-1.50	0.6-2.0	0.20-0.24	7.4-8.4	Low-----------	0.43	5	4L	1-2
	4-60	18-24	1.30-1.50	0.6-2.0	0.17-0.22	7.4-8.4	Low-----------	0.43			
Hobbs-------------	0-8	18-30	1.10-1.30	0.6-2.0	0.21-0.24	6.1-7.8	Low-----------	0.32	5	6	2-4
	8-60	18-30	1.20-1.40	0.6-2.0	0.18-0.22	6.1-8.4	Low-----------	0.32			
Cs, CsC----------- Cozad	0-12	11-25	1.30-1.40	0.6-2.0	0.20-0.22	6.1-7.3	Low-----------	0.32	5	6	2-4
	12-22	10-18	1.30-1.40	0.6-2.0	0.17-0.19	6.1-8.4	Low-----------	0.43			
	22-60	8-18	1.25-1.50	0.6-2.0	0.15-0.19	6.6-8.4	Low-----------	0.24			
Cz, CzB----------- Cozad	0-12	11-25	1.30-1.40	0.6-2.0	0.20-0.22	6.1-7.3	Low-----------	0.32	5	6	2-4
	12-22	10-18	1.30-1.40	0.6-2.0	0.17-0.19	6.1-8.4	Low-----------	0.43			
	22-60	8-18	1.20-1.50	0.6-2.0	0.15-0.19	6.6-8.4	Low-----------	0.24			
DuB--------------- Dunday	0-19	3-10	1.40-1.60	6.0-20	0.10-0.12	6.1-7.3	Low-----------	0.17	5	2	1-2
	19-60	2-7	1.50-1.70	6.0-20	0.05-0.08	6.1-7.8	Low-----------	0.17			
EcB--------------- Els	0-6	2-8	1.60-1.80	6.0-20	0.07-0.12	6.1-7.8	Low-----------	0.15	5	1	.5-1
	6-60	0-8	1.50-1.60	6.0-20	0.05-0.08	6.1-7.8	Low-----------	0.15			
Fm---------------- Fillmore Variant	0-7	18-25	1.30-1.40	0.6-2.0	0.22-0.24	6.1-7.8	Low-----------	0.37	5	6	3-4
	7-42	18-35	1.30-1.40	0.6-2.0	0.18-0.22	6.1-7.8	Moderate-----	0.37			
	42-57	18-30	1.30-1.40	0.6-2.0	0.20-0.22	6.1-7.8	Moderate-----	0.37			
	57-60	40-50	1.30-1.50	0.06-0.2	0.10-0.13	6.1-7.8	High---------	0.37			
Ga---------------- Gannett	0-20	5-18	1.20-1.50	2.0-6.0	0.15-0.19	7.4-8.4	Low-----------	0.20	5	8	3-4
	20-60	2-7	1.40-1.70	6.0-20	0.05-0.07	7.4-8.4	Low-----------	0.15			

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	G/cm3	In/hr	In/in	pH					Pct
Gb*:											
Gannett	0-20	5-18	1.20-1.50	2.0-6.0	0.15-0.19	7.4-8.4	Low	0.20	5	8	3-4
	20-60	2-7	1.50-1.70	6.0-20	0.05-0.07	7.4-8.4	Low	0.15			
Loup	0-12	8-18	1.10-1.30	0.6-2.0	0.20-0.22	7.4-8.4	Low	0.20	5	8	3-4
	12-60	2-7	1.50-1.70	6.0-20	0.06-0.08	6.6-8.4	Low	0.17			
GfC, GfD, GfE, GfF Gates	0-5	14-17	1.20-1.40	0.6-2.0	0.20-0.22	6.6-7.8	Low	0.37	5	3	.5-1
	5-18	13-15	1.20-1.40	0.6-2.0	0.17-0.19	7.4-7.8	Low	0.37			
	18-60	14-17	1.20-1.40	0.6-2.0	0.17-0.19	7.4-8.4	Low	0.37			
GhG*:											
Gates	0-5	14-17	1.20-1.40	0.6-2.0	0.20-0.22	6.6-7.8	Low	0.37	5	3	.5-1
	5-18	13-15	1.20-1.40	0.6-2.0	0.17-0.19	7.4-7.8	Low	0.37			
	18-60	14-17	1.20-1.40	0.6-2.0	0.17-0.19	7.4-8.4	Low	0.37			
Hersh	0-5	10-18	1.30-1.50	2.0-6.0	0.16-0.18	6.1-7.3	Low	0.24	5	3	.5-2
	5-10	8-18	1.30-1.50	2.0-6.0	0.15-0.18	6.1-7.3	Low	0.24			
	10-60	10-18	1.20-1.50	2.0-6.0	0.14-0.16	6.6-7.8	Low	0.24			
Gk Gibbon	0-10	20-25	1.40-1.60	0.6-2.0	0.21-0.23	7.4-8.4	Moderate	0.32	5	4L	2-4
	10-33	20-27	1.30-1.50	0.6-2.0	0.18-0.22	7.9-8.4	Moderate	0.32			
	33-60	15-25	1.50-1.70	0.6-6.0	0.16-0.20	7.4-9.0	Low	0.32			
Gr, GrB, GrC Graybert	0-10	14-20	1.20-1.30	0.6-2.0	0.20-0.22	6.6-7.3	Low	0.37	5	3	2-4
	10-24	14-18	1.15-1.25	0.6-2.0	0.17-0.19	6.6-7.8	Low	0.37			
	24-38	16-18	1.25-1.50	0.6-2.0	0.20-0.22	7.4-8.4	Low	0.37			
	38-60	16-20	1.20-1.40	0.6-2.0	0.20-0.22	7.9-8.4	Low	0.37			
Ha, HaB Hall	0-17	20-27	1.30-1.40	0.6-2.0	0.20-0.24	6.1-7.3	Moderate	0.32	5	6	2-4
	17-28	28-35	1.30-1.50	0.6-2.0	0.18-0.20	6.1-7.8	Moderate	0.43			
	28-60	20-30	1.30-1.40	0.6-2.0	0.18-0.22	6.6-7.8	Moderate	0.43			
HeB, HeC, HeD, HeE Hersh	0-5	10-18	1.30-1.50	2.0-6.0	0.16-0.18	6.1-7.3	Low	0.24	5	3	.5-1
	5-10	8-18	1.30-1.50	2.0-6.0	0.15-0.18	6.1-7.3	Low	0.24			
	10-60	10-18	1.20-1.50	2.0-6.0	0.14-0.16	6.6-7.8	Low	0.24			
HhF*:											
Hersh	0-5	10-18	1.30-1.50	2.0-6.0	0.16-0.18	6.1-7.3	Low	0.24	5	3	.5-1
	5-10	8-18	1.30-1.50	2.0-6.0	0.15-0.18	6.1-7.3	Low	0.24			
	10-60	10-18	1.20-1.50	2.0-6.0	0.14-0.16	6.6-7.8	Low	0.24			
Valentine	0-6	2-10	1.50-1.60	6.0-20	0.08-0.11	5.6-7.3	Low	0.15	5	2	.5-1
	6-60	0-8	1.50-1.60	6.0-20	0.06-0.08	5.6-7.3	Low	0.15			
Hk, Hm Hobbs	0-6	15-27	1.10-1.30	0.6-2.0	0.21-0.24	6.1-7.8	Low	0.32	5	6	2-4
	6-60	15-30	1.20-1.40	0.6-2.0	0.18-0.22	6.1-8.4	Low	0.32			
HoB, HoC Holdrege	0-10	15-25	1.40-1.60	0.6-2.0	0.22-0.24	6.1-7.3	Moderate	0.32	5	6	2-3
	10-32	28-35	1.20-1.40	0.6-2.0	0.18-0.20	6.6-7.8	Moderate	0.43			
	32-60	15-20	1.40-1.60	0.6-2.0	0.20-0.22	7.4-8.4	Moderate	0.43			
HoC2 Holdrege	0-6	28-35	1.40-1.60	0.6-2.0	0.21-0.23	6.1-7.3	Moderate	0.32	5	6	1-2
	6-25	28-35	1.20-1.40	0.6-2.0	0.18-0.20	6.6-7.8	Moderate	0.43			
	25-60	15-20	1.40-1.60	0.6-2.0	0.20-0.22	7.4-8.4	Moderate	0.43			
HoD Holdrege	0-7	15-25	1.40-1.60	0.6-2.0	0.22-0.24	6.1-7.3	Moderate	0.32	5	6	2-3
	7-31	28-35	1.20-1.40	0.6-2.0	0.18-0.20	6.6-7.8	Moderate	0.43			
	31-60	15-20	1.40-1.60	0.6-2.0	0.20-0.22	7.4-8.4	Moderate	0.43			
HoD2 Holdrege	0-5	28-35	1.40-1.60	0.6-2.0	0.21-0.23	6.1-7.3	Moderate	0.32	5	6	1-2
	5-23	28-35	1.20-1.40	0.6-2.0	0.18-0.20	6.6-7.8	Moderate	0.43			
	23-60	15-20	1.40-1.60	0.6-2.0	0.20-0.22	7.4-8.4	Moderate	0.43			

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	G/cm3	In/hr	In/in	pH					Pct
HpB--------------- Hord	0-21	8-20	1.40-1.60	2.0-6.0	0.16-0.18	6.1-7.3	Low-----------	0.20	5	3	2-3
	21-32	20-35	1.35-1.45	0.6-2.0	0.17-0.22	6.6-7.8	Low-----------	0.32			
	32-60	18-30	1.30-1.50	0.6-2.0	0.17-0.22	6.6-8.4	Low-----------	0.43			
Hr, HrB, HrC, Ht, HtB------------- Hord	0-17	17-27	1.30-1.40	0.6-2.0	0.20-0.24	6.1-7.3	Low-----------	0.32	5	6	2-4
	17-45	20-35	1.35-1.45	0.6-2.0	0.17-0.22	6.6-7.8	Low-----------	0.32			
	45-60	18-30	1.30-1.50	0.6-2.0	0.17-0.22	7.4-8.4	Low-----------	0.43			
InB--------------- Inavale	0-6	7-18	1.50-1.60	6.0-20	0.10-0.12	6.6-7.8	Low-----------	0.17	5	2	.5-1
	6-24	3-10	1.50-1.60	6.0-20	0.06-0.11	6.6-8.4	Low-----------	0.17			
	24-60	3-10	1.50-1.60	6.0-20	0.05-0.10	6.6-8.4	Low-----------	0.17			
IpB--------------- Ipage	0-12	3-10	1.40-1.50	6.0-20	0.10-0.12	6.1-7.3	Low-----------	0.17	5	2	.5-1
	12-60	1-8	1.50-1.60	6.0-20	0.06-0.10	6.1-7.3	Low-----------	0.17			
Ks, KsB----------- Kenesaw	0-10	12-20	1.20-1.40	0.6-2.0	0.20-0.24	6.1-7.3	Low-----------	0.32	5	6	2-3
	10-17	10-18	1.20-1.30	0.6-2.0	0.17-0.22	6.6-8.4	Low-----------	0.43			
	17-60	10-18	1.30-1.40	0.6-2.0	0.17-0.22	7.4-8.4	Low-----------	0.43			
Or---------------- Ord	0-10	8-15	1.40-1.60	0.6-6.0	0.16-0.24	6.6-8.4	Low-----------	0.20	5	3	1-2
	10-28	8-15	1.50-1.70	2.0-6.0	0.15-0.17	6.6-8.4	Low-----------	0.20			
	28-60	3-12	1.60-1.80	2.0-20	0.02-0.04	6.6-8.4	Low-----------	0.20			
Ov---------------- Ovina	0-19	7-15	1.40-1.60	0.6-2.0	0.20-0.22	7.4-8.4	Low-----------	0.28	5	5	1-2
	19-60	8-18	1.30-1.50	2.0-6.0	0.15-0.17	7.4-8.4	Low-----------	0.17			
Pg*. Pits											
Ru---------------- Rusco	0-10	28-35	1.20-1.30	0.2-0.6	0.21-0.23	6.1-7.8	Moderate-----	0.32	5	6	2-3
	10-22	28-35	1.20-1.30	0.2-0.6	0.18-0.20	6.6-8.4	Moderate-----	0.43			
	22-60	15-25	1.40-1.50	0.6-2.0	0.17-0.22	6.6-8.4	Low-----------	0.43			
Sc---------------- Scott	0-5	15-35	1.30-1.40	0.6-2.0	0.22-0.24	5.6-7.3	Low-----------	0.37	4	6	2-4
	5-40	40-55	1.30-1.50	<0.06	0.10-0.14	5.6-7.8	High----------	0.37			
	40-49	32-40	1.10-1.40	0.2-0.6	0.18-0.20	6.6-7.8	High----------	0.37			
	49-60	18-40	1.30-1.50	0.6-2.0	0.14-0.22	6.6-7.8	Moderate-----	0.37			
UbD, UbE---------- Uly	0-10	17-27	1.20-1.30	0.6-2.0	0.20-0.24	6.1-7.8	Low-----------	0.32	5	6	2-3
	10-25	20-32	1.20-1.30	0.6-2.0	0.18-0.22	6.1-8.4	Low-----------	0.43			
	25-60	18-27	1.10-1.20	0.6-2.0	0.18-0.22	7.4-8.4	Low-----------	0.43			
UcF*:											
Uly--------------	0-10	17-27	1.20-1.30	0.6-2.0	0.20-0.24	6.1-7.8	Low-----------	0.32	5	6	2-3
	10-25	20-32	1.20-1.30	0.6-2.0	0.18-0.22	6.1-8.4	Low-----------	0.43			
	25-60	18-27	1.10-1.20	0.6-2.0	0.18-0.22	7.4-8.4	Low-----------	0.43			
Coly-------------	0-4	18-24	1.30-1.50	0.6-2.0	0.20-0.24	7.4-8.4	Low-----------	0.43	5	4L	1-2
	4-60	18-24	1.30-1.50	0.6-2.0	0.17-0.22	7.4-8.4	Low-----------	0.43			
VaB, VaD, VaE----- Valentine	0-6	0-6	1.50-1.60	6.0-20	0.06-0.11	5.6-7.3	Low-----------	0.15	5	1	.5-1
	6-60	0-8	1.50-1.60	6.0-20	0.06-0.08	5.6-7.3	Low-----------	0.15			
VaF--------------- Valentine	0-6	0-6	1.50-1.60	6.0-20	0.06-0.11	6.1-7.3	Low-----------	0.15	5	1	.5-1
	6-60	0-8	1.50-1.60	6.0-20	0.06-0.08	6.1-7.3	Low-----------	0.15			
VbB, VbD, VbE----- Valentine	0-6	2-10	1.50-1.60	6.0-20	0.08-0.11	6.1-7.3	Low-----------	0.17	5	2	.5-1
	6-60	0-8	1.50-1.60	6.0-20	0.06-0.08	6.1-7.3	Low-----------	0.15			

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern]

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months		Uncoated steel	Concrete
					Ft					
AfB, An, AnC, Ao, AoB: Anselmo	A	None	---	---	>6.0	---	---	Moderate	Moderate	Low.
Ba: Barney	D	Frequent	Long	Mar-Jun	0-2.0	Apparent	Nov-Jun	Moderate	High	Low.
Bn: Barney Variant	B	Frequent	Long	Mar-Jun	+.5-1.0	Apparent	Nov-Jun	Moderate	Low	Low.
Bo, Bp: Boel	A	Occasional	Brief	Mar-Jun	1.5-3.5	Apparent	Nov-May	Moderate	High	Low.
BxB*: Boel	A	Frequent	Brief	Mar-Jun	1.5-3.5	Apparent	Nov-May	Moderate	High	Low.
Ca: Cass	B	Rare	---	---	>6.0	---	---	Moderate	Moderate	Low.
CoD2*, CoF2*: Coly	B	None	---	---	>6.0	---	---	Moderate	High	Low.
Uly	B	None	---	---	>6.0	---	---	Moderate	High	Low.
CrG*: Coly	B	None	---	---	>6.0	---	---	Moderate	High	Low.
Hobbs	B	Occasional	Brief	Apr-Sep	>6.0	---	---	Moderate	Low	Low.
Cs, CsC: Cozad	B	None	---	---	>6.0	---	---	Moderate	Low	Low.
Cz, CzB: Cozad	B	Rare	---	---	>6.0	---	---	Moderate	Low	Low.
DuB: Dunday	A	None	---	---	>6.0	---	---	Low	Low	Low.
EcB: Els	A	None to rare	---	---	1.5-3.5	Apparent	Nov-May	Moderate	Moderate	Low.
Fm: Fillmore Variant	D	None	---	---	+.5-3.0	Perched	Mar-Jul	High	High	Low.
Ga: Gannett	D	None	---	---	+.5-1.0	Apparent	Nov-May	High	High	Low.
Gb*: Gannett	D	Occasional	Brief	Mar-Jul	0-1.5	Apparent	Nov-May	High	High	Low.
Loup	D	Occasional	Brief	Jan-Jul	0-1.5	Apparent	Nov-May	Moderate	High	Low.
GfC, GfD, GfE, GfF: Gates	B	None	---	---	>6.0	---	---	Moderate	Low	Low.
GhG*: Gates	B	None	---	---	>6.0	---	---	Moderate	Low	Low.
Hersh	B	None	---	---	>6.0	---	---	Moderate	Low	Low.
Gk: Gibbon	B	Occasional	Very brief	Mar-Jul	1.5-3.0	Apparent	Nov-Jun	High	High	Low.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months		Uncoated steel	Concrete
					Ft					
Gr, GrB, GrC------ Graybert	B	None--------	---	---	>6.0	---	---	Low------	Low------	Low.
Ha, HaB----------- Hall	B	None--------	---	---	>6.0	---	---	Moderate	Moderate	Low.
HeB, HeC, HeD, HeE-------------- Hersh	B	None--------	---	---	>6.0	---	---	Moderate	Low------	Low.
HhF*:										
Hersh------------	B	None--------	---	---	>6.0	---	---	Moderate	Low------	Low.
Valentine--------	A	None--------	---	---	>6.0	---	---	Low------	Low------	Low.
Hk---------------- Hobbs	B	Occasional	Brief-----	Apr-Sep	>6.0	---	---	Moderate	Low------	Low.
Hm---------------- Hobbs	B	Frequent----	Brief-----	Apr-Sep	>6.0	---	---	Moderate	Low------	Low.
HoB, HoC, HoC2, HoD, HoD2-------- Holdrege	B	None--------	---	---	>6.0	---	---	Moderate	Low------	Low.
HpB--------------- Hord	B	Rare--------	---	---	>6.0	---	---	Moderate	High-----	Low.
Hr, HrB, HrC------ Hord	B	None--------	---	---	>6.0	---	---	Moderate	High-----	Low.
Ht, HtB----------- Hord	B	Rare--------	---	---	>6.0	---	---	Moderate	High-----	Low.
InB--------------- Inavale	A	Occasional	Very brief	Jan-Jul	>6.0	---	---	Low------	Moderate	Low.
IpB--------------- Ipage	A	None--------	---	---	3.0-6.0	Apparent	Dec-Jun	Moderate	Low------	Moderate.
Ks, KsB----------- Kenesaw	B	None--------	---	---	>6.0	---	---	Moderate	Moderate	Low.
Or---------------- Ord	B	Occasional	Brief-----	Mar-May	1.5-3.5	Apparent	Nov-May	High-----	High-----	Low.
Ov---------------- Ovina	B	Rare--------	---	---	1.5-3.0	Apparent	May-Nov	High-----	Moderate	Low.
Pg*. Pits										
Ru---------------- Rusco	D	None--------	---	---	+.5-2.0	Perched	Mar-Jun	High-----	High-----	Low.
Sc---------------- Scott	D	None--------	---	---	+.5-1.0	Perched	Mar-Aug	High-----	High-----	Low.
UbD, UbE---------- Uly	B	None--------	---	---	>6.0	---	---	Moderate	High-----	Low.
UcF*:										
Uly--------------	B	None--------	---	---	>6.0	---	---	Moderate	High-----	Low.
Coly-------------	B	None--------	---	---	>6.0	---	---	Moderate	High-----	Low.
VaB, VaD, VaE, VaF Valentine	A	None--------	---	---	>6.0	---	---	Low------	Low------	Low.
VbB, VbD, VbE----- Valentine	A	None--------	---	---	>6.0	---	---	Low------	Low------	Low.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 18.--ENGINEERING INDEX TEST DATA

[Dashes indicate data were not available. NP means nonplastic]

Soil name and report number*	Horizon and depth	Classification		Grain-size distribution							Liquid limit	Plasticity index	Specific gravity
				Percentage passing sieve--				Percentage smaller than--					
		AASHTO	Unified	No. 4	No. 10	No. 40	No. 200	.05 mm	.005 mm	.002 mm			
	In										Pct		G/cm3
Anselmo fine sandy loam: (S70NE-021-013)	Ap------- 0 to 7	A-4 (03)	ML	100	100	99	51	32	11	10	19	NP	2.63
	B2------- 7 to 17	A-4 (06)	ML	100	100	99	63	47	15	14	22	3	2.67
	C1-------17 to 30	A-4 (02)	SM	100	100	100	43	26	9	7	--	NP	2.64
Boel loamy fine sand: (S68NE-21-180)	A1------- 0 to 10	A-2-4(00)	SM	100	99	93	21	13	4	4	--	NP	--
	C1-------16 to 38	A-3 (02)	SP-SM	100	99	91	7	6	4	4	--	NP	--
	IIIC3----42 to 52	A-2-4(00)	SM	100	98	96	35	19	4	4	--	NP	--
Coly silt loam: (S70NE-021-009)	Ap------- 0 to 40	A-6 (10)	CL	100	100	100	98	93	25	23	37	15	2.66
	C--------40 to 60	A-4 (08)	ML	100	100	100	98	90	22	17	31	8	2.67
Els fine sand: (S70NE-021-007)	A1------- 0 to 6	A-2-4(00)	SM	100	100	97	19	12	4	3	--	NP	2.51
	C3-------26 to 52	A-2-4(00)	SP-SM	100	100	98	11	7	3	3	--	NP	2.63
Gates very fine sandy loam: (S74NE-041-003)	Ap------- 0 to 5	A-4 (08)	ML	100	100	100	95	80	15	10	31	3	--
	AC------- 5 to 18	A-4 (08)	ML	100	100	100	95	82	17	14	32	3	--
	C1-------18 to 60	A-4 (08)	ML	100	100	100	96	85	13	10	30	2	--
Hall silt loam: (S70NE-021-011)	Ap------- 0 to 6	A-4 (08)	ML	100	100	100	93	80	18	14	27	3	2.60
	B2t------17 to 28	A-6 (11)	CL	100	100	100	95	88	31	26	38	18	2.67
	C2-------45 to 60	A-4 (08)	ML	100	100	100	95	86	18	10	30	5	2.67
Hersh fine sandy loam: (S75NE-041-002)	A12------ 4 to 10	A-4 (08)	ML	100	100	99	74	50	12	11	--	NP	--
	AC-------10 to 18	A-4 (05)	ML	100	100	100	61	22	9	9	--	NP	--
	C2-------26 to 54	A-4 (01)	SM	100	100	99	40	17	7	6	--	NP	--
Hobbs silt loam: (S70NE-021-014)	Ap------- 0 to 7	A-4 (08)	ML	100	100	100	95	87	19	16	30	7	2.64
	A12------ 7 to 40	A-4 (08)	ML	100	100	100	97	90	23	19	31	6	2.60
	A13------40 to 60	A-6 (10)	CL	100	100	100	98	91	29	26	37	14	2.60
Holdrege silt loam: (S70NE-021-012)	Ap------- 0 to 6	A-6 (10)	CL	100	100	100	89	78	29	26	34	14	2.67
	B2t------ 9 to 16	A-6 (09)	CL	100	100	100	91	80	29	24	32	13	2.65
	C2-------40 to 60	A-4 (08)	ML	100	100	100	94	84	17	13	30	5	2.64
Hord silt loam: (S70NE-021-008)	A1------- 0 to 17	A-4 (08)	ML	100	100	100	87	76	19	12	31	7	2.62
	B22------28 to 45	A-6 (09)	CL	100	100	100	96	91	24	20	34	12	2.65
	C1-------45 to 60	A-4 (08)	ML	100	100	100	95	90	21	15	31	8	2.67
Ord fine sandy loam: (S76NE-041-003)	A1------- 0 to 8	A-4 (05)	ML	100	100	100	60	49	10	8	25	NP	--
	AC------- 8 to 16	A-4 (03)	ML	100	100	100	52	38	9	8	23	NP	--
	C2-------22 to 28	A-2-4(00)	SM	100	100	100	18	12	5	4	--	NP	--

See footnote at end of table.

TABLE 18.--ENGINEERING INDEX TEST DATA--Continued

Soil name and report number*	Horizon and depth	Classification		Grain-size distribution							Liquid limit	Plasticity index	Specific gravity
				Percentage passing sieve--				Percentage smaller than--					
		AASHTO	Unified	No. 4	No. 10	No. 40	No. 200	.05 mm	.005 mm	.002 mm			
	In										Pct		G/cm3
Uly silt loam: (S70NE-021-010)	A1------- 0 to 7	A-6 (09)	CL	100	100	100	97	88	23	17	36	12	2.61
	B2--------14 to 22	A-6 (10)	CL	100	100	100	98	86	28	23	36	14	2.67
	C---------22 to 60	A-4 (08)	CL	100	100	100	98	87	23	17	31	10	2.67
Valentine fine sand: (S70NE-021-015)	A1------- 0 to 6	A-2-4(00)	SP-SM	100	100	97	12	8	5	4	--	NP	2.63
	C---------12 to 60	A-3 (00)	SP-SM	100	100	98	7	4	3	3	--	NP	2.68

*The locations of the pedons sampled for engineering tests are as follows:

Anselmo fine sandy loam: 180 feet west and 400 feet south of the northeast corner of sec. 16, T. 15 N., R. 22 W.

Boel loamy fine sand: 686 feet north and 792 feet east of the southwest corner of sec. 10, T. 14 N., R. 21 W.

Coly silt loam: 320 feet south and 2,376 feet west of the northeast corner of sec. 13, T. 13 N., R. 19 W.

Els fine sand: 1,584 feet north and 1,056 feet west of the southeast corner of sec. 5, T. 20 N., R. 24 W.

Gates very fine sandy loam: 200 feet north and 2,440 feet west of the southeast corner of sec. 6, T. 18 N., R. 22 W.

Hall silt loam: 100 feet west and 1,584 feet north of the southeast corner of sec. 23, T. 16 N., R. 23 W.

Hersh fine sandy loam: 50 feet north and 300 feet east of the southwest corner of sec. 6, T. 18 N., R. 22 W.

Hobbs silt loam: 160 feet north and 790 feet west of the northeast corner of sec. 33, T. 14 N., R. 18 W.

Holdrege silt loam: 1,056 feet north and 790 feet west of the southeast corner of sec. 25, T. 18 N., R. 24 W.

Hord silt loam: 2,640 feet south and 2,540 feet east of the northwest corner of sec. 25, T. 15 N., R. 18 W.

Ord fine sandy loam: 300 feet north and 1,584 feet east of the southwest corner of sec. 14, T. 15 N., R. 22 W.

Uly silt loam: 1,320 feet west and 2,375 feet south of the northeast corner of sec. 34, T. 15 N., R. 21 W.

Valentine fine sand: 200 feet south and 2,790 feet east of the northwest corner of sec. 5, T. 20 N., R. 24 W.

TABLE 19.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Anselmo	Coarse-loamy, mixed, mesic Typic Haplustolls
Barney	Sandy, mixed, mesic Mollic Fluvaquents
Barney Variant	Coarse-loamy, mixed, mesic Mollic Fluvaquents
Boel	Sandy, mixed, mesic Fluvaquentic Haplustolls
Cass	Coarse-loamy, mixed, mesic Fluventic Haplustolls
Coly	Fine-silty, mixed (calcareous), mesic Typic Ustorthents
Cozad	Coarse-silty, mixed, mesic Fluventic Haplustolls
Dunday	Sandy, mixed, mesic Entic Haplustolls
Els	Mixed, mesic Mollic Psammaquents
Fillmore Variant	Fine-silty, mixed, mesic Aquic Ustifluvents
Gannett	Coarse-loamy, mixed, mesic Typic Haplaquolls
Gates	Coarse-silty, mixed, nonacid, mesic Typic Ustorthents
Gibbon	Fine-silty, mixed (calcareous), mesic Fluvaquentic Haplaquolls
Graybert	Coarse-silty, mixed, mesic Typic Haplustolls
Hall	Fine-silty, mixed, mesic Pachic Argiustolls
Hersh	Coarse-loamy, mixed, nonacid, mesic Typic Ustorthents
Hobbs	Fine-silty, mixed, nonacid, mesic Mollic Ustifluvents
Holdrege	Fine-silty, mixed, mesic Typic Argiustolls
Hord	Fine-silty, mixed, mesic Cumulic Haplustolls
Inavale	Sandy, mixed, mesic Typic Ustifluvents
Ipage	Mixed, mesic Aquic Ustipsamments
Kenesaw	Coarse-silty, mixed, mesic Typic Haplustolls
Loup	Sandy, mixed, mesic Typic Haplaquolls
Ord	Coarse-loamy, mixed, mesic Fluvaquentic Haplustolls
Ovina	Coarse-loamy, mixed, mesic Fluvaquentic Haplustolls
Rusco	Fine-silty, mixed, mesic Aquic Argiustolls
Scott	Fine, montmorillonitic, mesic Typic Argialbolls
Uly	Fine-silty, mixed, mesic Typic Haplustolls
Valentine	Mixed, mesic Typic Ustipsamments

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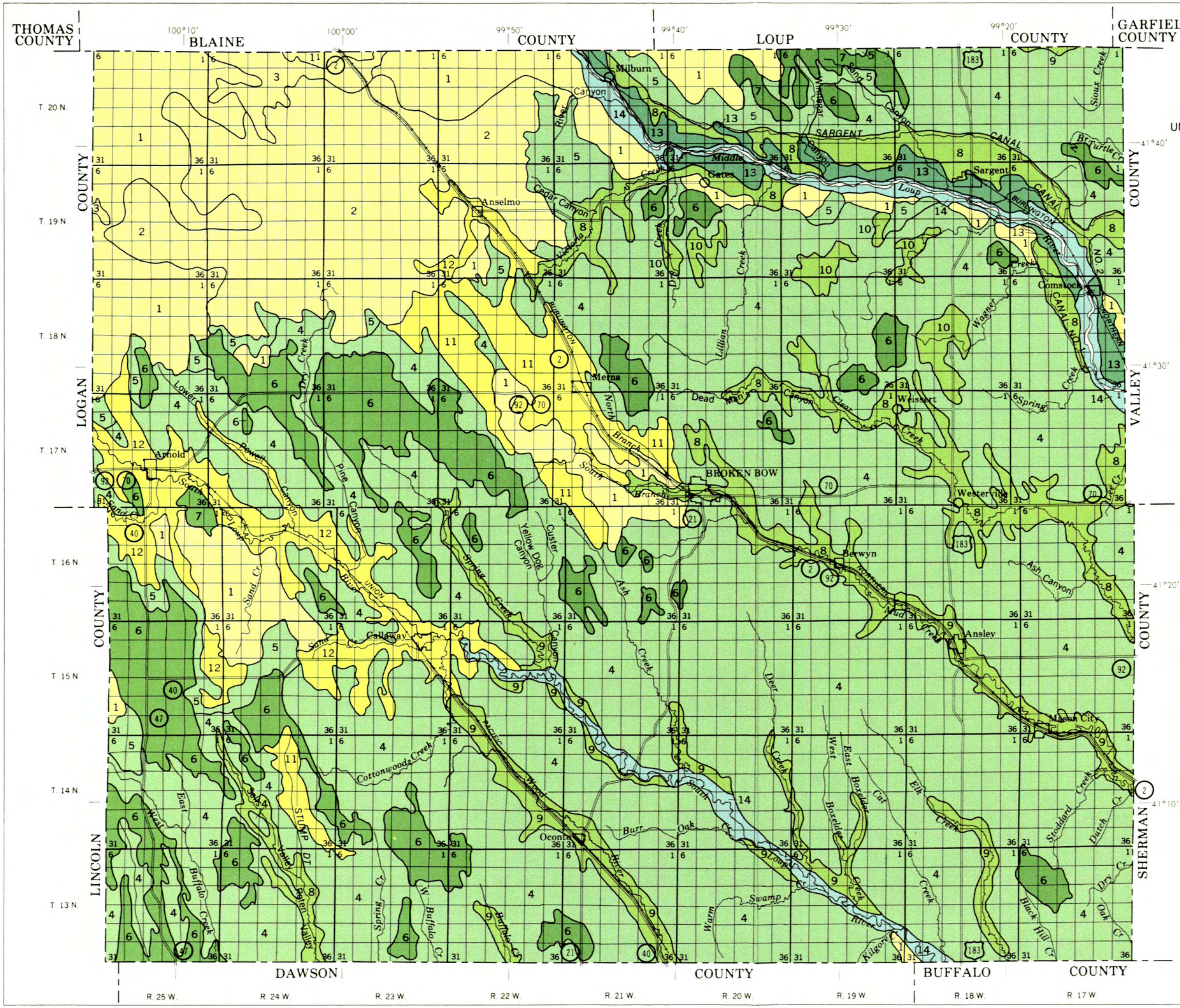


U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
UNIVERSITY OF NEBRASKA CONSERVATION AND SURVEY DIVISION

GENERAL SOIL MAP

CUSTER COUNTY, NEBRASKA

Scale 1:316,800

1 0 1 2 3 4 5 Miles

1 0 1 2 3 4 5 6 7 8 Kilometers

SOIL LEGEND*

NEARLY LEVEL TO HILLY, SANDY SOILS OF THE SANDHILLS

1	Valentine association, rolling and hilly: Deep, rolling and hilly, excessively drained, sandy soils on uplands
2	Valentine association: Deep, nearly level to rolling, excessively drained, sandy soils on uplands
3	Valentine-Els association: Deep, nearly level to rolling, excessively drained and somewhat poorly drained, sandy soils in sandhill valleys

STRONGLY SLOPING TO VERY STEEP, SILTY AND LOAMY SOILS ON DISSECTED UPLANDS

4	Uly-Coly association: Deep, strongly sloping to very steep, well drained to excessively drained, silty soils on uplands
5	Gates-Hersh association: Deep, strongly sloping to very steep, well drained to excessively drained, loamy soils on uplands

NEARLY LEVEL TO STRONGLY SLOPING, SILTY AND LOAMY SOILS ON UPLANDS

6	Holdrege-Hall-Hord association: Deep, nearly level to strongly sloping, well drained, silty soils on uplands
7	Hersh-Gates-Kenesaw association: Deep, nearly level to strongly sloping, well drained, loamy soils on uplands

NEARLY LEVEL TO GENTLY SLOPING, SILTY SOILS ON STREAM TERRACES AND IN VALLEYS

8	Cozad association: Deep, nearly level to gently sloping, well drained, silty soils on stream terraces
9	Hord-Cozad association: Deep, nearly level to gently sloping, well drained, silty soils on stream terraces
10	Hord-Hall-Cozad association: Deep, nearly level to gently sloping, well drained, silty soils in valleys

NEARLY LEVEL TO STRONGLY SLOPING, SILTY, LOAMY, AND SANDY SOILS IN VALLEYS AND ON STREAM TERRACES

11	Kenesaw-Hord-Gates association: Deep, nearly level to strongly sloping, well drained, loamy and silty soils in valleys
12	Anselmo-Cozad association: Deep, nearly level to gently sloping, well drained, loamy, silty, and sandy soils on stream terraces

NEARLY LEVEL TO ROLLING, SANDY SOILS ON STREAM TERRACES

13	Ipage-Valentine association: Deep, nearly level to rolling, moderately well drained and excessively drained, sandy soils on stream terraces

NEARLY LEVEL, LOAMY AND SANDY SOILS ON BOTTOM LANDS

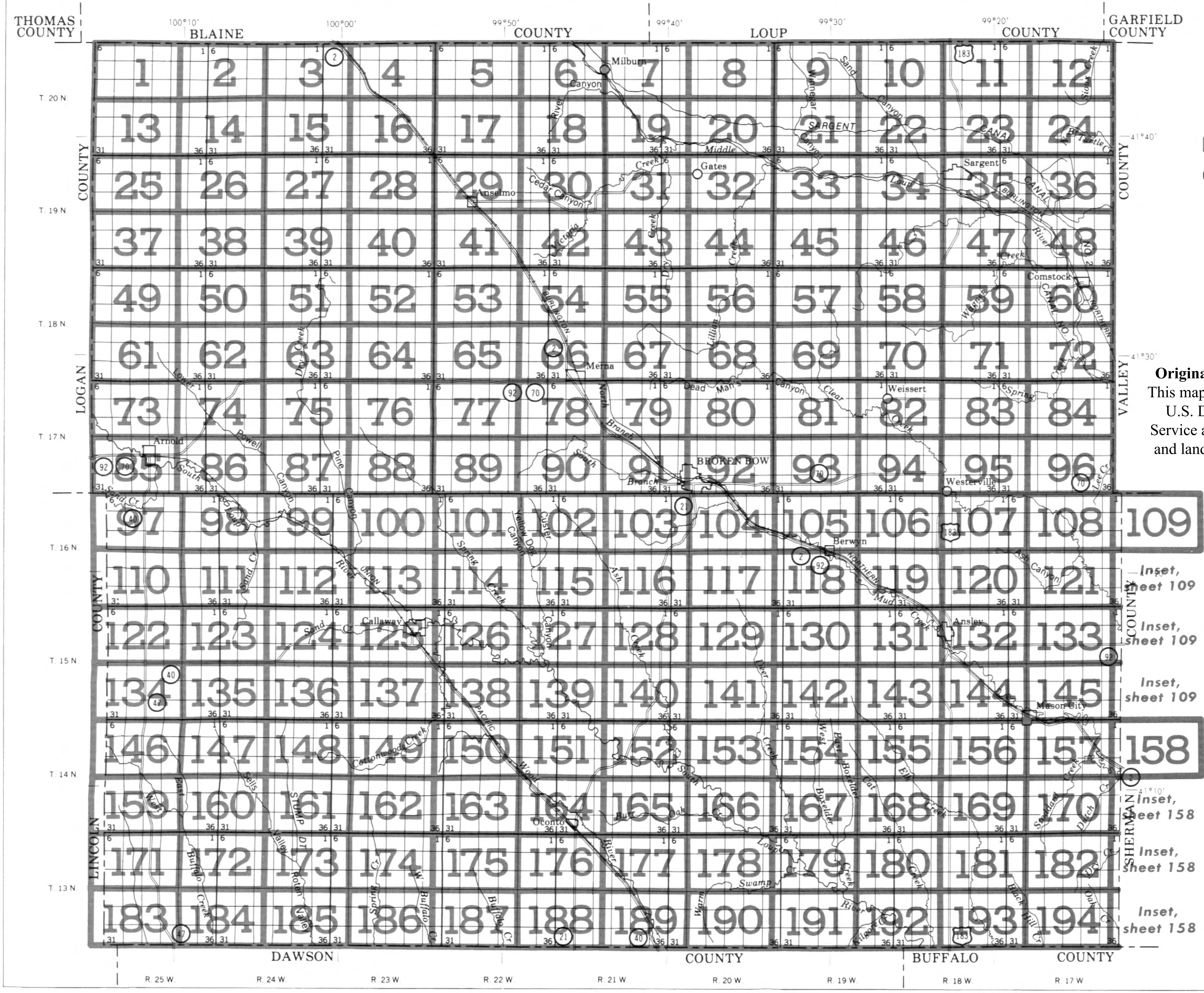
14	Boel-Barney-Gannett association: Deep, nearly level, somewhat poorly drained and poorly drained, sandy and loamy soils on bottom lands

*Texture terms in the descriptive headings refer to the surface layer of the major soils in the associations.

Compiled 1982

SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36



INDEX TO MAP SHEETS
CUSTER COUNTY, NEBRASKA

Scale 1: 316,800
1 0 1 2 3 4 5 Miles
1 0 1 2 3 4 5 6 7 8 Kilometers

Original text from each individual map sheet read:
This map is compiled on 1976 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

SOIL LEGEND

Map symbols consist of a combination of letters or of letters and a number. The first capital letter is the initial one of the map unit name. The lower-case letter that follows separates map units having names that begin with the same letter, except that it does not separate sloping or eroded phases. The second capital letter indicates the class of slope. Symbols without a slope letter are for nearly level soils or miscellaneous areas. A final number of 2 indicates that the soil is eroded.

SYMBOL	NAME
AfB	Anselmo loamy fine sand, 0 to 3 percent slopes
An	Anselmo fine sandy loam, 0 to 2 percent slopes
AnC	Anselmo fine sandy loam, 2 to 6 percent slopes
Ao	Anselmo very fine sandy loam, 0 to 1 percent slopes
AoB	Anselmo very fine sandy loam, 1 to 3 percent slopes
Ba	Barney fine sandy loam, 0 to 2 percent slopes
Bn	Barney Variant loam, 0 to 1 percent slopes
Bo	Boel loamy fine sand, 0 to 2 percent slopes
Bp	Boel fine sandy loam, 0 to 2 percent slopes
BxB	Boel soils, channeled, 0 to 3 percent slopes
Ca	Cass fine sandy loam, 0 to 2 percent slopes
CoD2	Coly-Uly silt loams, 6 to 11 percent slopes, eroded
CoF2	Coly-Uly silt loams, 11 to 20 percent slopes, eroded
CrG	Coly-Hobbs silt loams, 2 to 60 percent slopes
Cs	Cozad silt loam, 0 to 1 percent slopes
CsC	Cozad silt loam, 3 to 6 percent slopes
Cz	Cozad silt loam, terrace, 0 to 1 percent slopes
CzB	Cozad silt loam, terrace, 1 to 3 percent slopes
DuB	Dunday loamy fine sand, 0 to 3 percent slopes
EcB	Els fine sand, 0 to 3 percent slopes
Fm	Fillmore Variant silt loam, 0 to 1 percent slopes
Ga	Gannett loam, 0 to 1 percent slopes
Gb	Gannett and Loup loams, 0 to 2 percent slopes
GfC	Gates very fine sandy loam, 3 to 6 percent slopes
GfD	Gates very fine sandy loam, 6 to 11 percent slopes
GfE	Gates very fine sandy loam, 11 to 15 percent slopes
GfF	Gates very fine sandy loam, 15 to 30 percent slopes
GhG	Gates-Hersh complex, 30 to 60 percent slopes
Gk	Gibbon silt loam, 0 to 1 percent slopes
Gr	Graybert very fine sandy loam, 0 to 1 percent slopes
GrB	Graybert very fine sandy loam, 1 to 3 percent slopes
GrC	Graybert very fine sandy loam, 3 to 6 percent slopes
Ha	Hall silt loam, 0 to 1 percent slopes
HaB	Hall silt loam, 1 to 3 percent slopes
HeB	Hersh fine sandy loam, 0 to 3 percent slopes
HeC	Hersh fine sandy loam, 3 to 6 percent slopes
HeD	Hersh fine sandy loam, 6 to 11 percent slopes
HeE	Hersh fine sandy loam, 11 to 15 percent slopes
HhF	Hersh-Valentine complex, 15 to 30 percent slopes
Hk	Hobbs silt loam, 0 to 2 percent slopes
Hm	Hobbs silt loam, channeled, 0 to 2 percent slopes
HoB	Holdrege silt loam, 1 to 3 percent slopes
HoC	Holdrege silt loam, 3 to 6 percent slopes
HoC2	Holdrege silty clay loam, 3 to 6 percent slopes, eroded
HoD	Holdrege silt loam, 6 to 11 percent slopes
HoD2	Holdrege silty clay loam, 6 to 11 percent slopes, eroded
HpB	Hord fine sandy loam, 0 to 3 percent slopes
Hr	Hord silt loam, 0 to 1 percent slopes
HrB	Hord silt loam, 1 to 3 percent slopes
HrC	Hord silt loam, 3 to 6 percent slopes
Ht	Hord silt loam, terrace, 0 to 1 percent slopes
HtB	Hord silt loam, terrace, 1 to 3 percent slopes
InB	Inavale loamy fine sand, 0 to 3 percent slopes
IpB	Ipage loamy fine sand, 0 to 3 percent slopes
Ks	Kenesaw very fine sandy loam, 0 to 1 percent slopes
KsB	Kenesaw very fine sandy loam, 1 to 3 percent slopes
Or	Ord very fine sandy loam, 0 to 1 percent slopes
Ov	Ovina loam, 0 to 2 percent slopes
Pg	Pits, gravel
Ru	Rusco silty clay loam, 0 to 1 percent slopes
Sc	Scott silty clay loam, 0 to 1 percent slopes
UbD	Uly silt loam, 6 to 11 percent slopes
UbE	Uly silt loam, 11 to 15 percent slopes
UcF	Uly-Coly silt loams, 15 to 30 percent slopes
VaB	Valentine fine sand, 0 to 3 percent slopes
VaD	Valentine fine sand, 3 to 9 percent slopes
VaE	Valentine fine sand, rolling
VaF	Valentine fine sand, rolling and hilly
VbB	Valentine loamy fine sand, 0 to 3 percent slopes
VbD	Valentine loamy fine sand, 3 to 9 percent slopes
VbE	Valentine loamy fine sand, rolling

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- County or parish
- Reservation (national forest or park, state forest or park, and large airport)
- Field sheet matchline & neatline

AD HOC BOUNDARY (label)

- Small airport, airfield, park, oilfield, cemetery

STATE COORDINATE TICK

LAND DIVISION CORNERS (sections and land grants)

ROADS

- Other roads
- Trail

ROAD EMBLEMS & DESIGNATIONS

- Federal
- State
- County, farm or ranch

RAILROAD

LEVEES

- Without road

DAMS

- Medium or small

PITS

- Gravel pit

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban areas)
- Church
- School
- Located object (label) — Tower
- Windmill

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
- Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial
- Intermittent

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS — HaB HoC2

ESCARPMENTS

- Other than bedrock (points down slope)

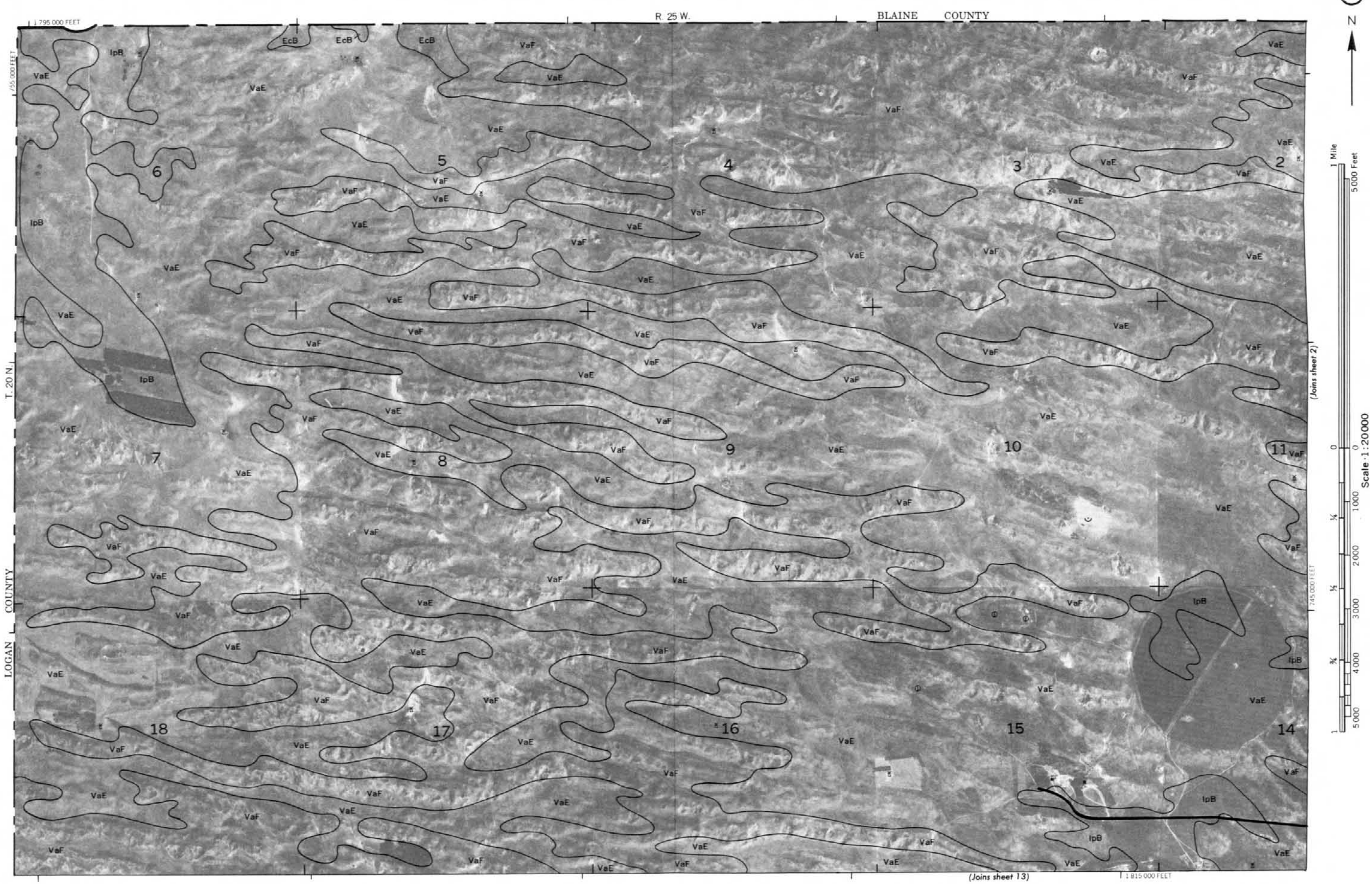
SHORT STEEP SLOPE

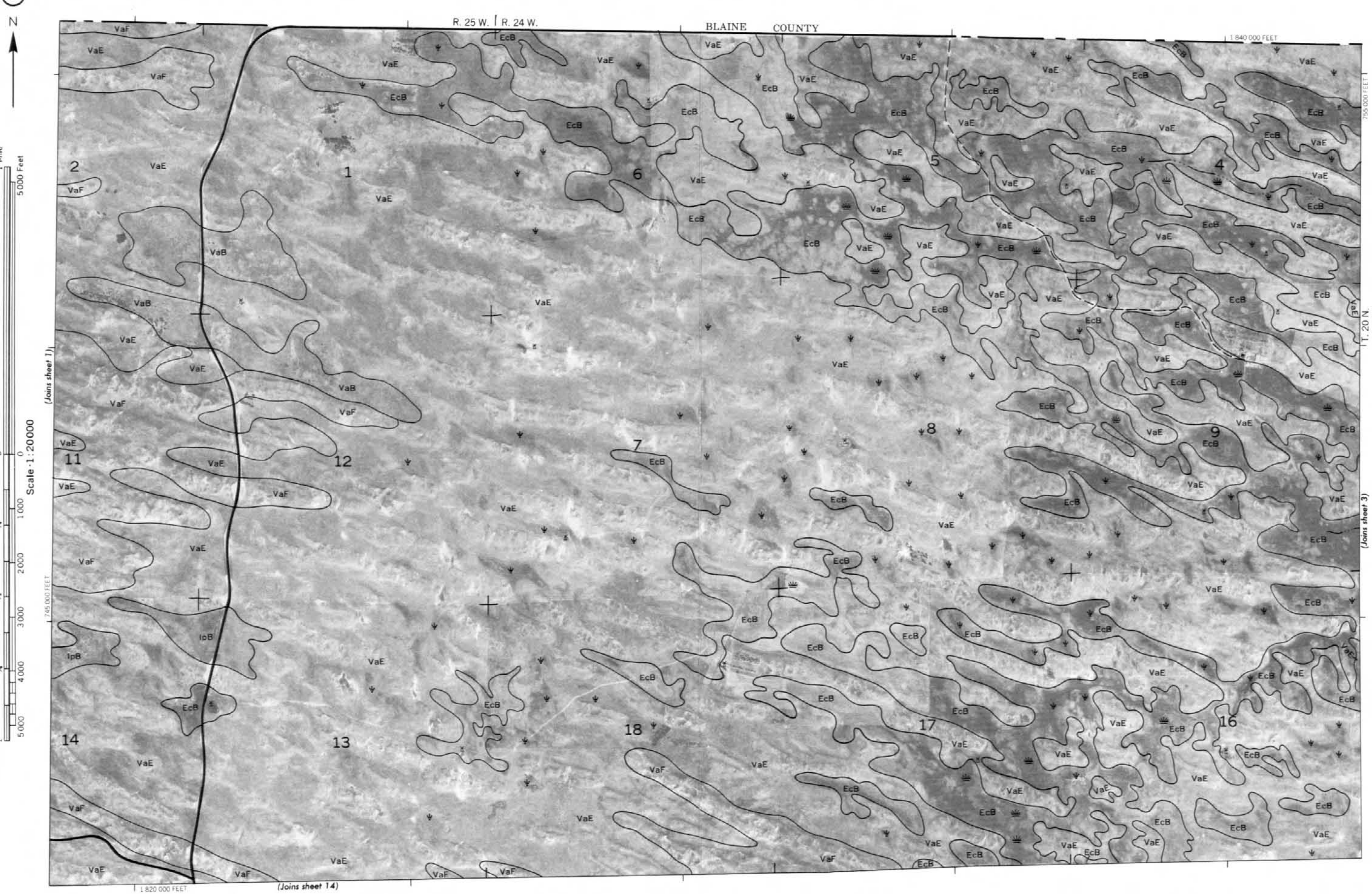
DEPRESSION OR SINK

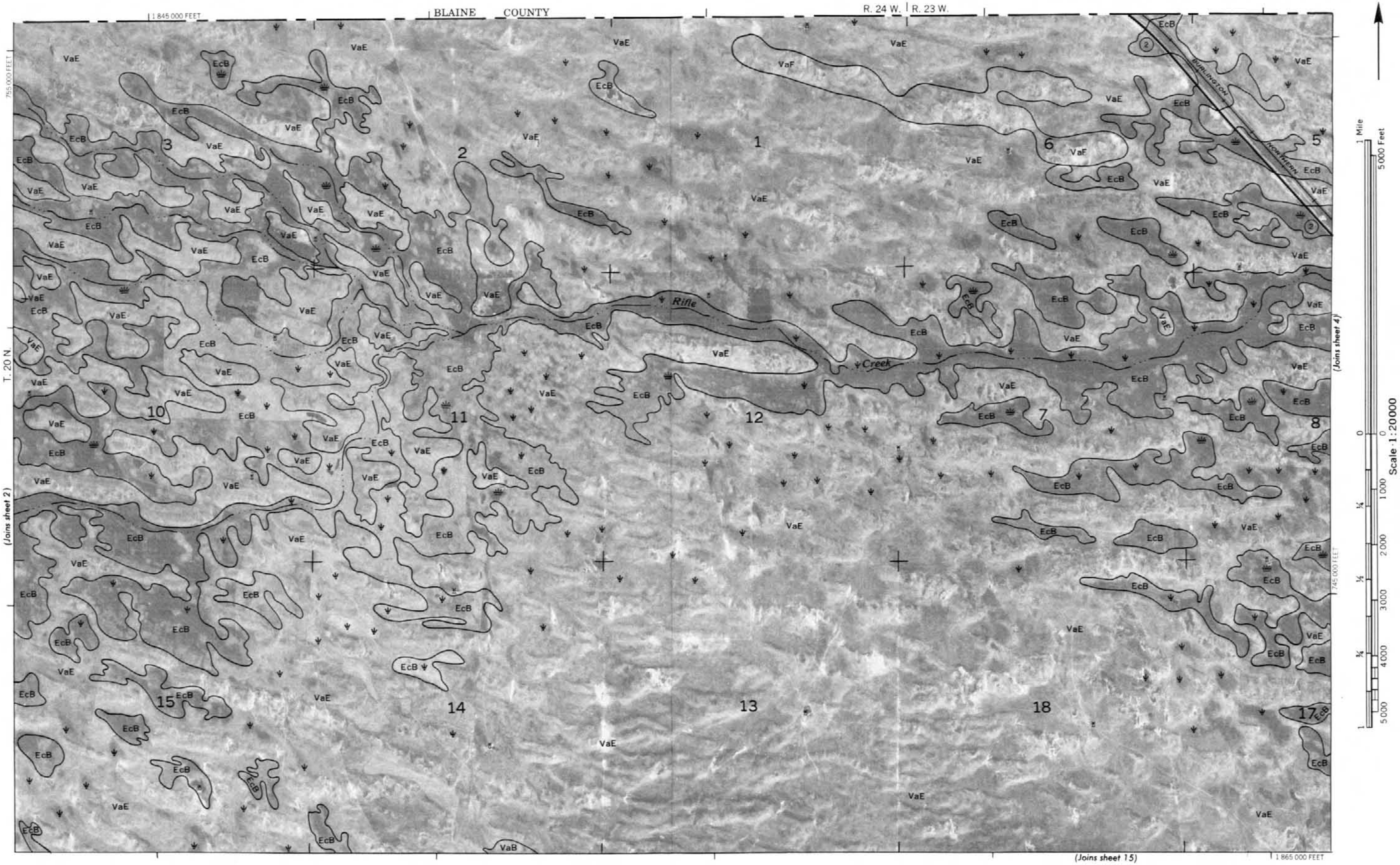
MISCELLANEOUS

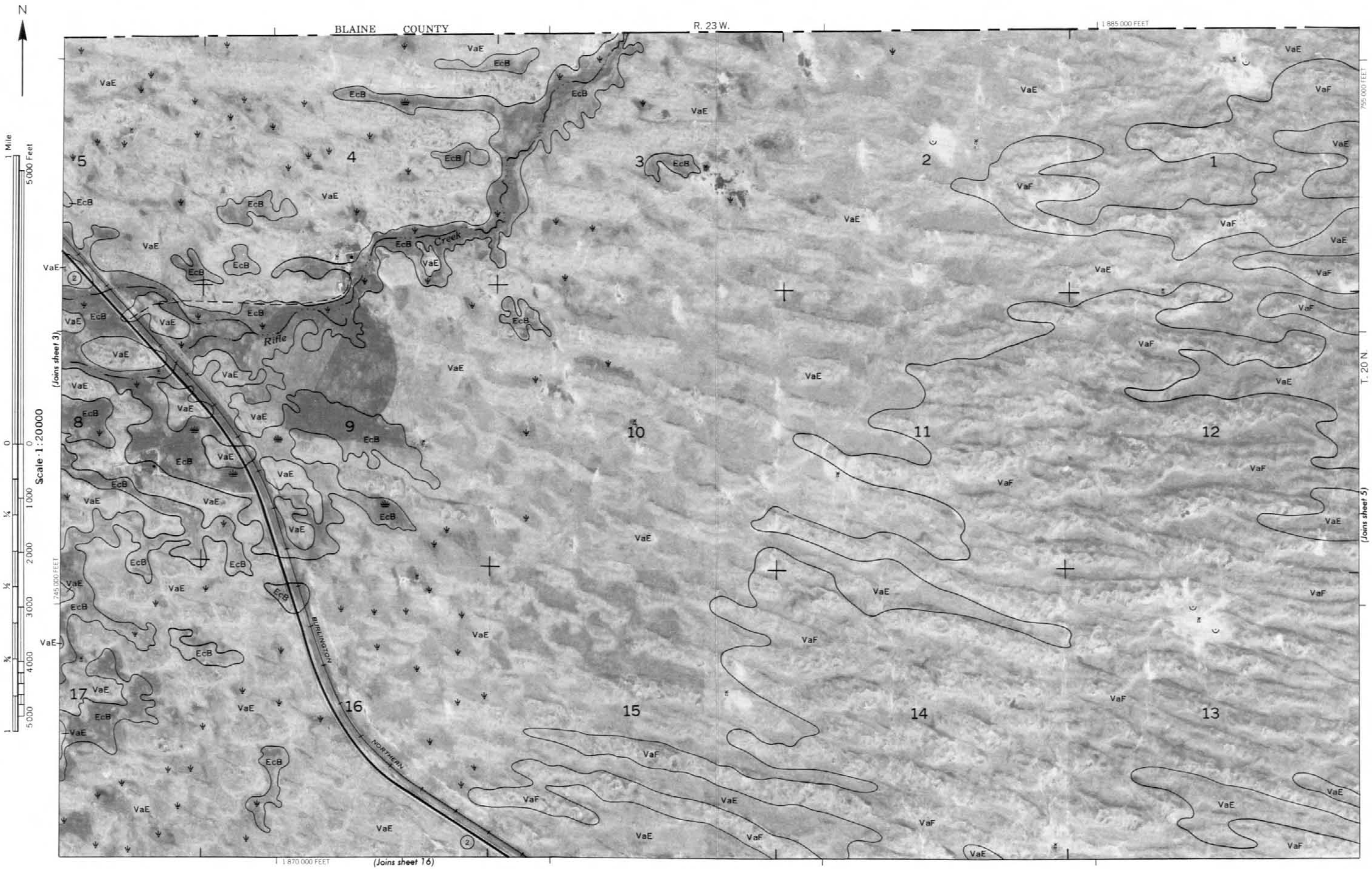
- Blowout
- Gravelly spot
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Loess outcrop in sand
- Reddish brown loess spot

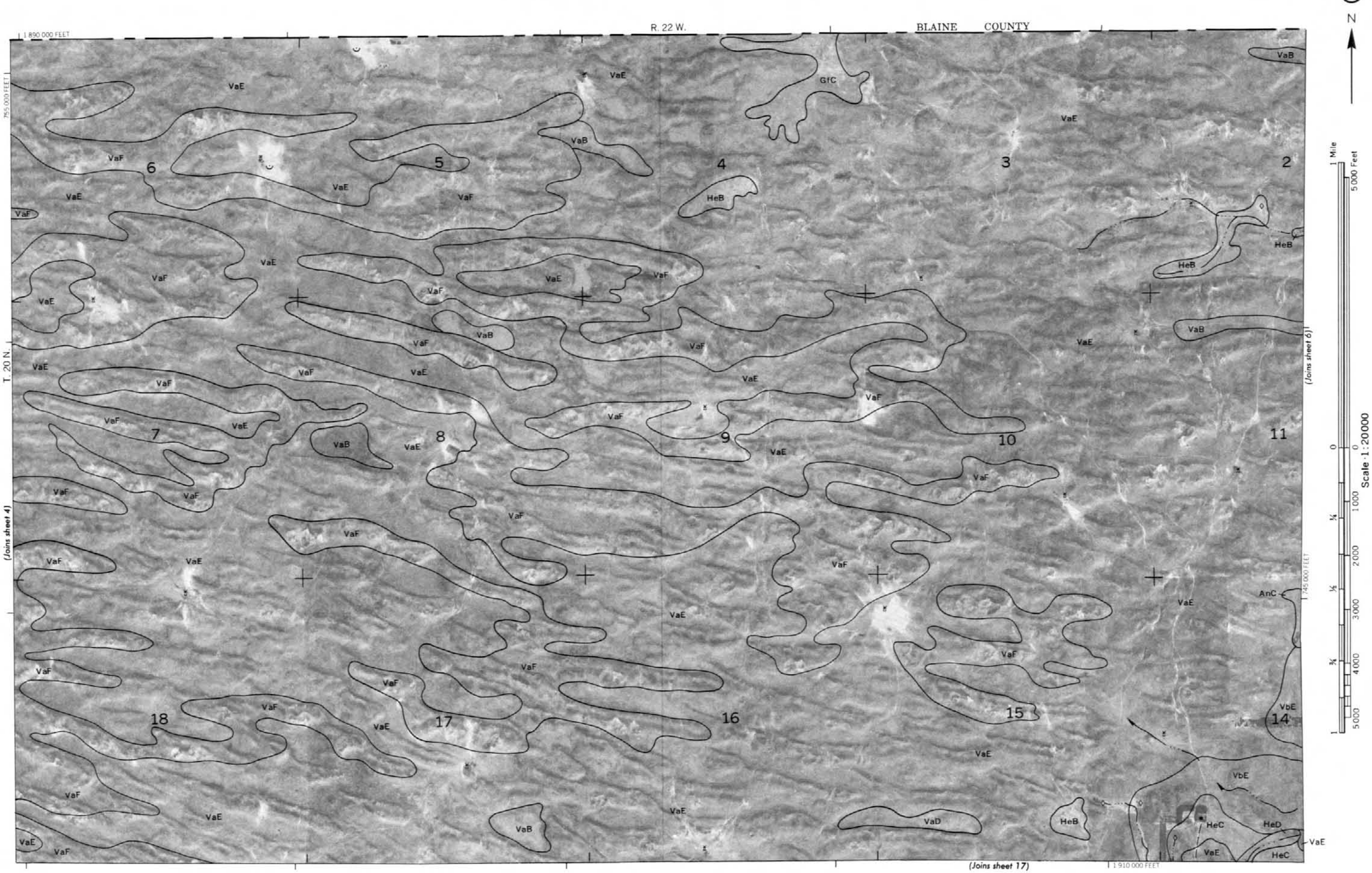
CUSTER COUNTY, NEBRASKA — SHEET NUMBER 1

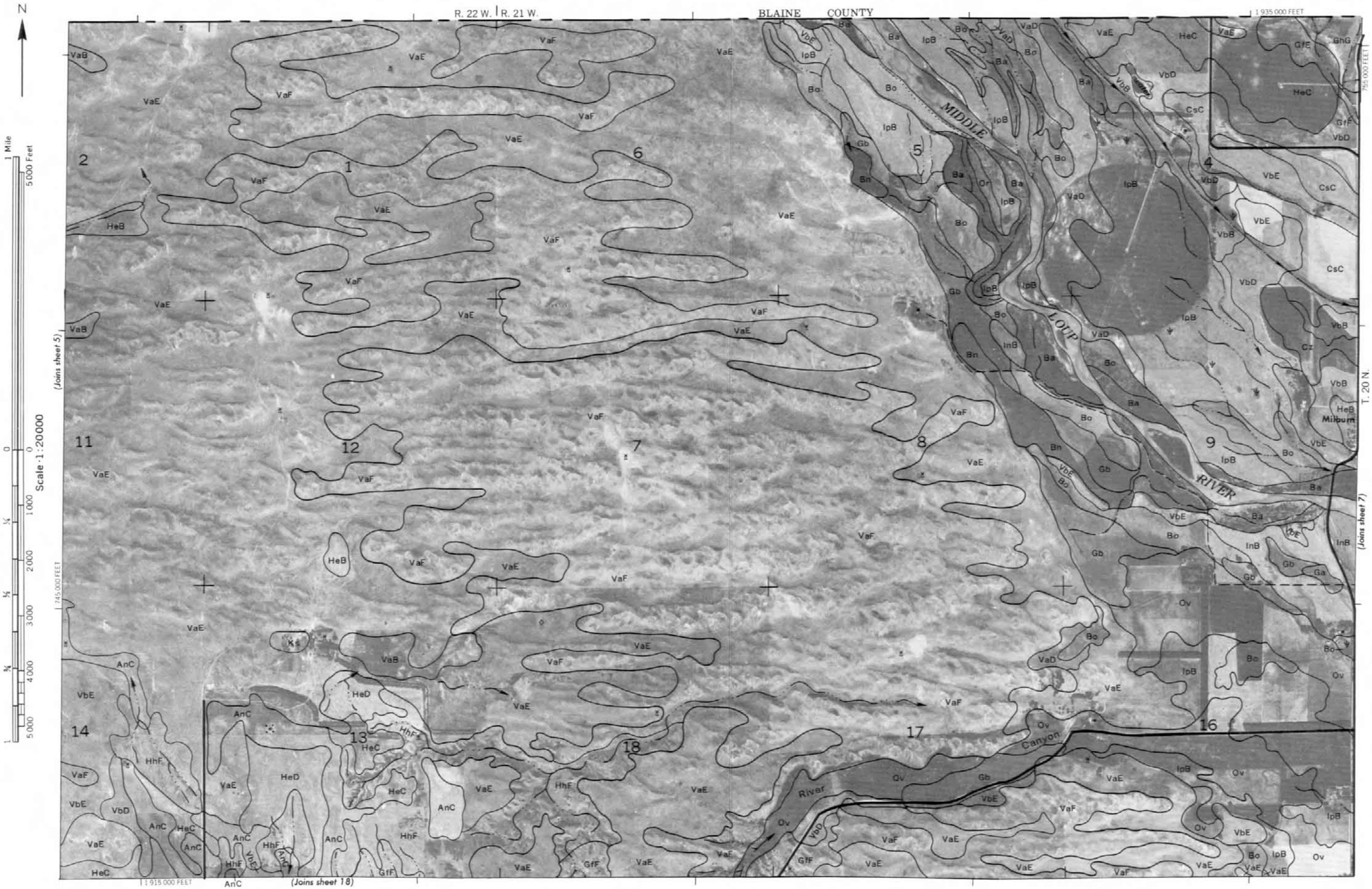


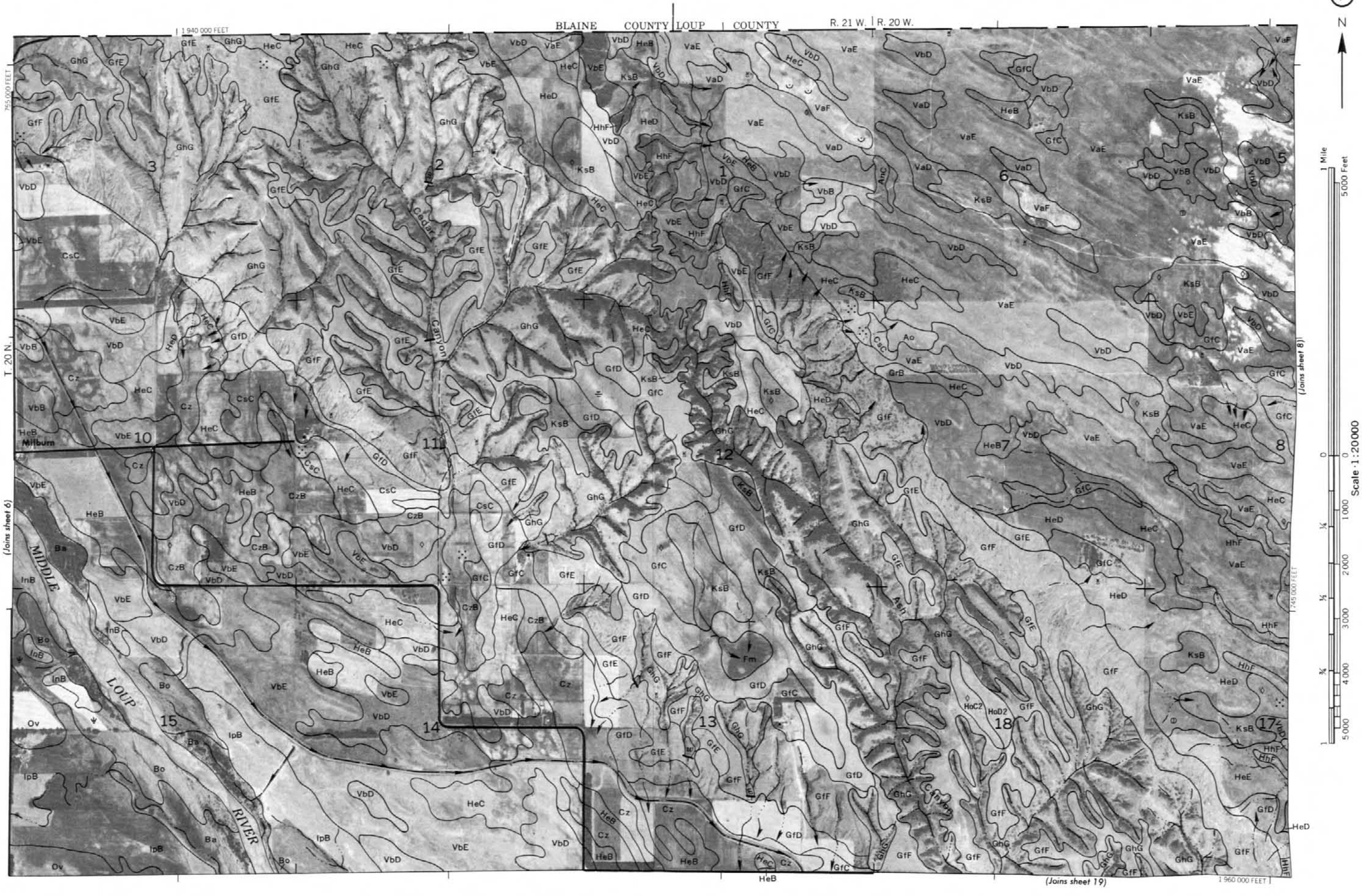

2
N
BLAINE COUNTY
R. 25 W. R. 24 W.
1 840 000 FEET
755 000 FEET
T. 20 N.
745 000 FEET
1 820 000 FEET
(Joins sheet 1)
(Joins sheet 3)
(Joins sheet 14)
1 Mile
5000 Feet
Scale 1:20000
1 2 3 4 5 6 7 8 9 11 12 13 14 16 17 18
VaE
VaF
VaB
EcB
IpB


BLAINE COUNTY
1 845 000 FEET
R. 24 W.
R. 23 W.
755 000 FEET
T. 20 N.
(Joins sheet 2)
(Joins sheet 4)
(Joins sheet 15)
745 000 FEET
1 865 000 FEET
BURLINGTON
NORTHERN
Rifle
Creek
1
2
3
5
6
7
8
10
11
12
13
14
15
17
18
VaE
VaF
EcB
VaB
N
1 Mile
5000 Feet
Scale 1:20000

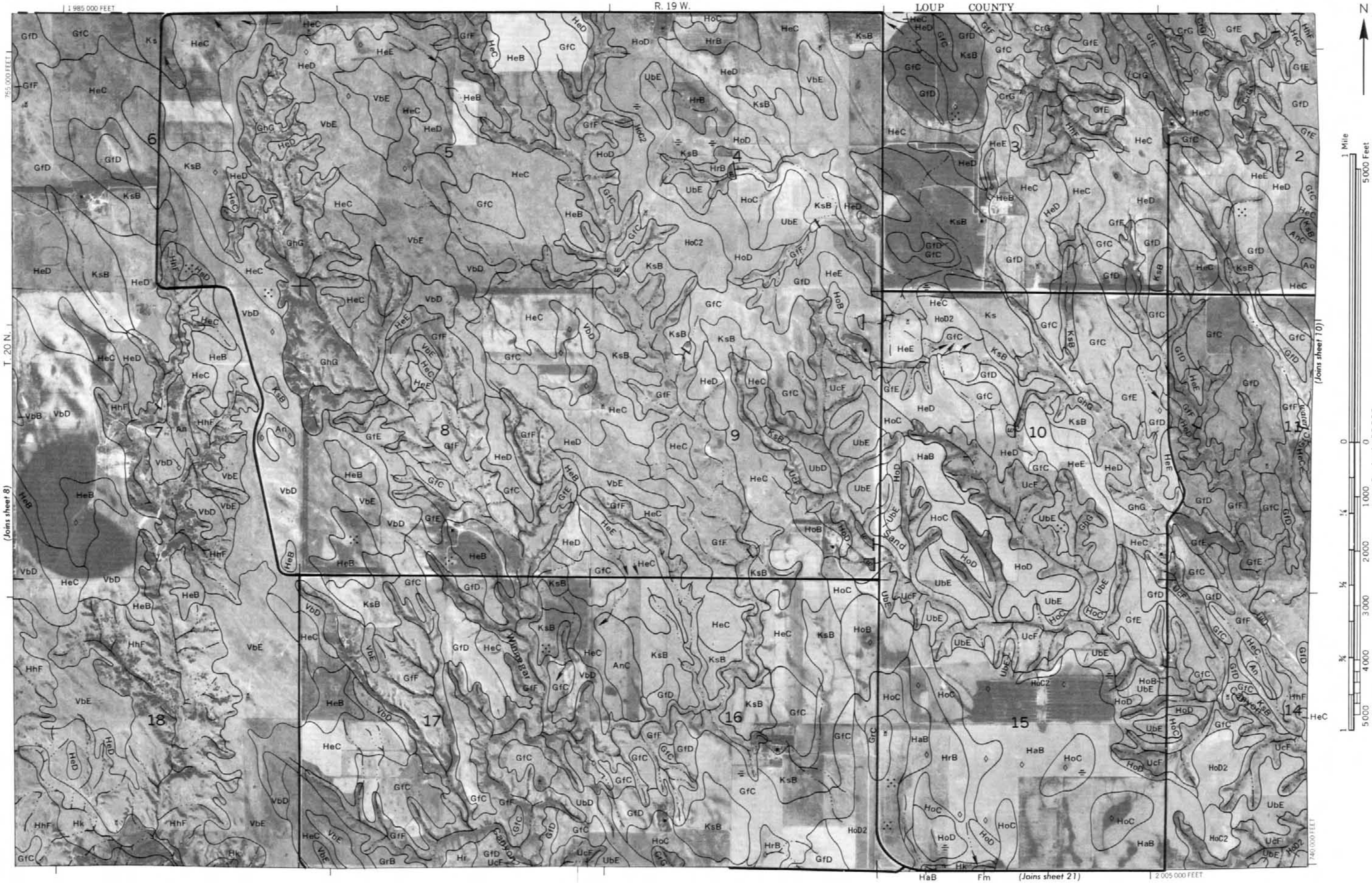

4
N
BLAINE COUNTY
R. 23 W.
1 885 000 FEET
755 000 FEET
T. 20 N.
(Joins sheet 5)
(Joins sheet 3)
(Joins sheet 16)
1 870 000 FEET
745 000 FEET
BURLINGTON
NORTHERN
Rifle
Creek
2
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
¼
½
¾
1
2
3
4
5
8
9
10
11
12
13
14
15
16
17
VaE
VaF
EcB


5
N
R. 22 W.
BLAINE COUNTY
1 890 000 FEET
755 000 FEET
745 000 FEET
1 910 000 FEET
T. 20 N.
(Joins sheet 4)
(Joins sheet 6)
(Joins sheet 17)
1 Mile
5000 Feet
Scale 1:20000
0
¼
½
¾
1
1000
2000
3000
4000
5000
2
3
4
5
6
7
8
9
10
11
14
15
16
17
18
VaE
VaF
VaB
VaD
GfC
HeB
HeC
HeD
AnC
VbE

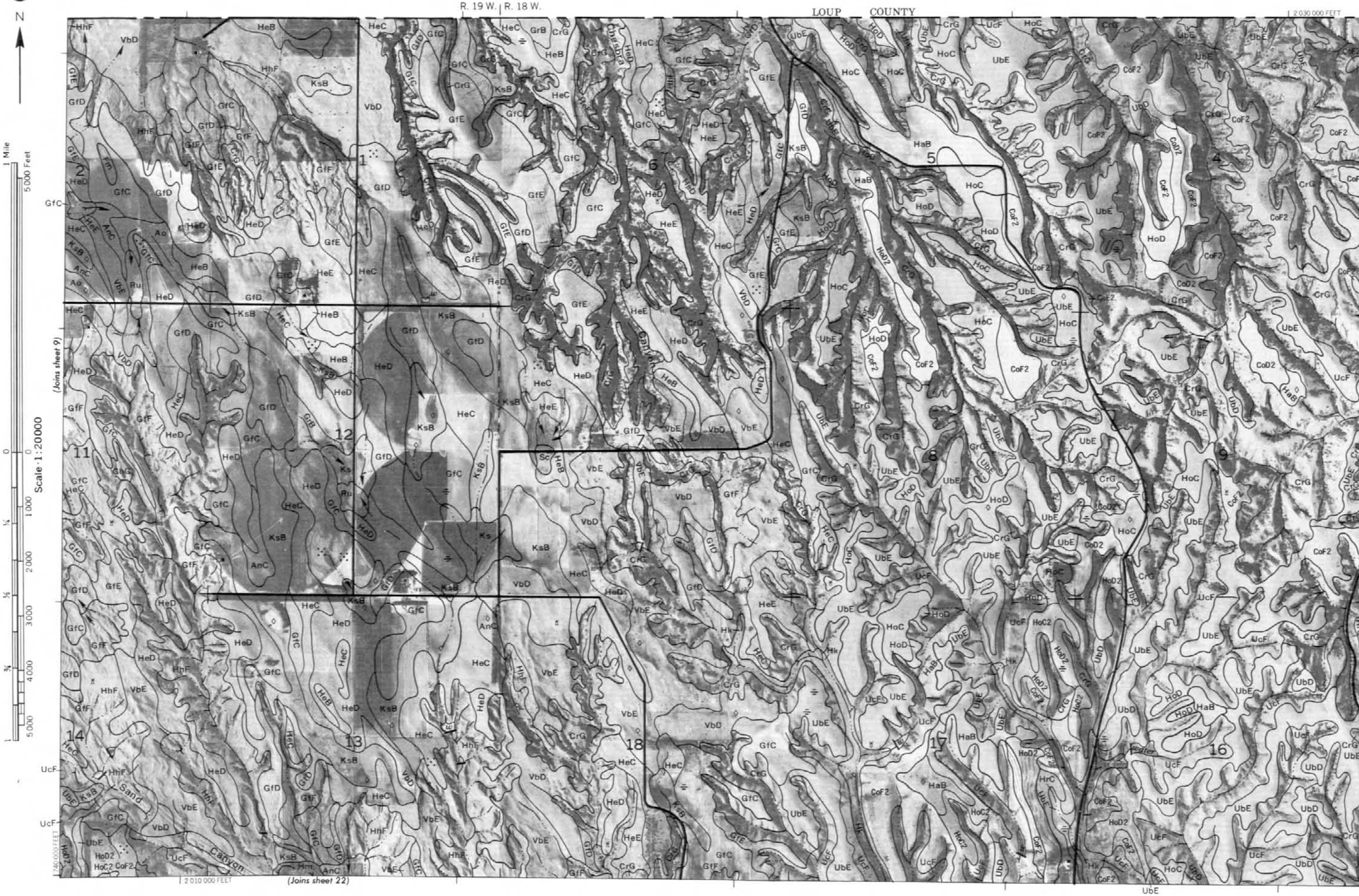

N
1 Mile
5000 Feet
Scale 1:20000
R. 22 W.
R. 21 W.
BLAINE COUNTY
1 935 000 FEET
755 000 FEET
745 000 FEET
1 915 000 FEET
T. 20 N.
(Joins sheet 5)
(Joins sheet 7)
(Joins sheet 18)
MIDDLE LOUP RIVER
Canyon
River
Milburn
1
2
4
5
6
7
8
9
11
12
13
14
16
17
18
VaB
VaE
VaF
VaD
VbB
VbD
VbE
HeB
HeC
HeD
HhF
AnC
Ks
IpB
InB
Bo
Ba
Bn
Gb
Ga
GfF
GhG
Or
Ov
CsC
Cz

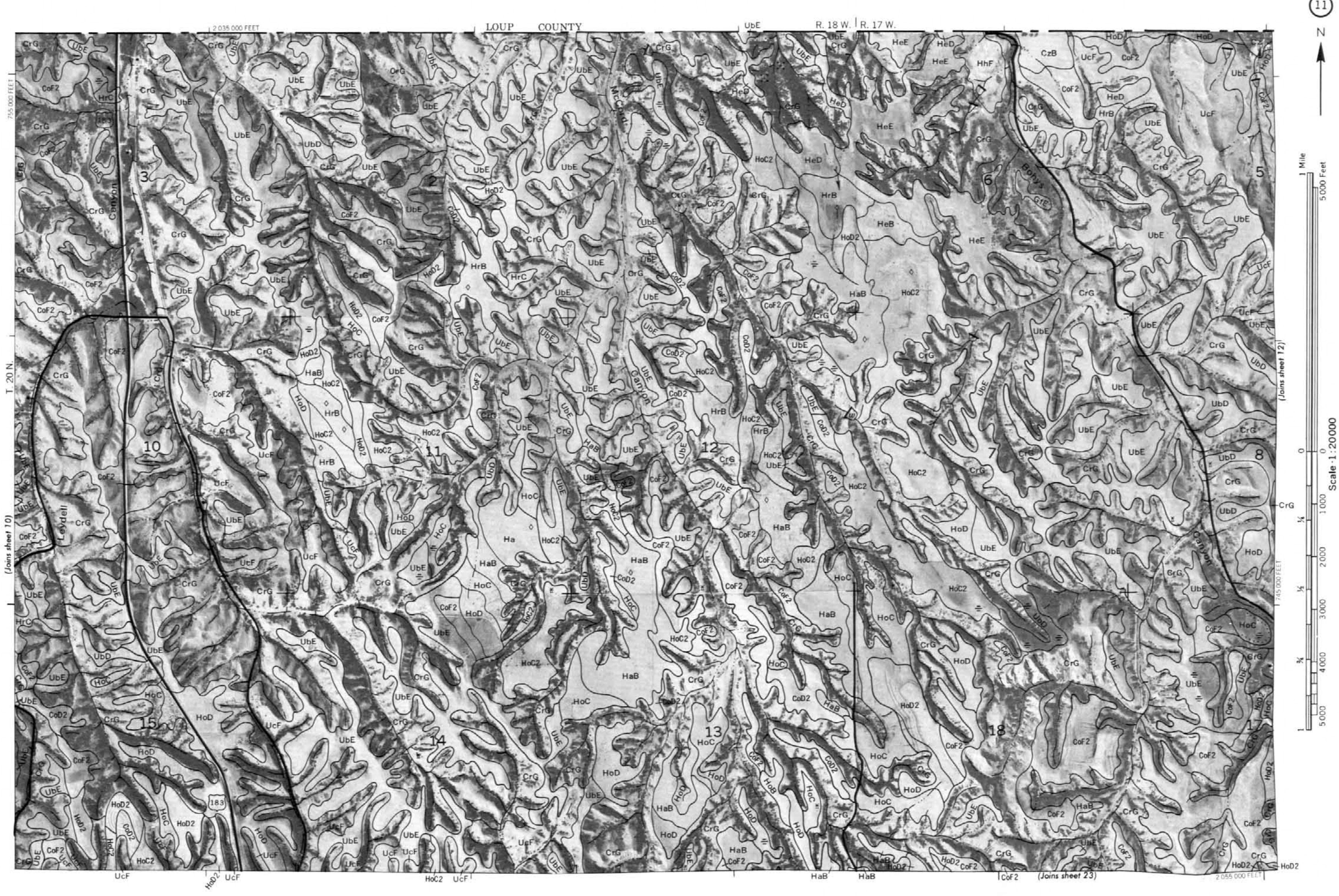

7
N
BLAINE COUNTY
LOUP COUNTY
R. 21 W.
R. 20 W.
1 940 000 FEET
755 000 FEET
T. 20 N.
Cedar Canyon
Ash Canyon
Milburn
MIDDLE LOUP RIVER
(Joins sheet 6)
(Joins sheet 8)
(Joins sheet 19)
245 000 FEET
1 960 000 FEET
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
¼
½
¾
1

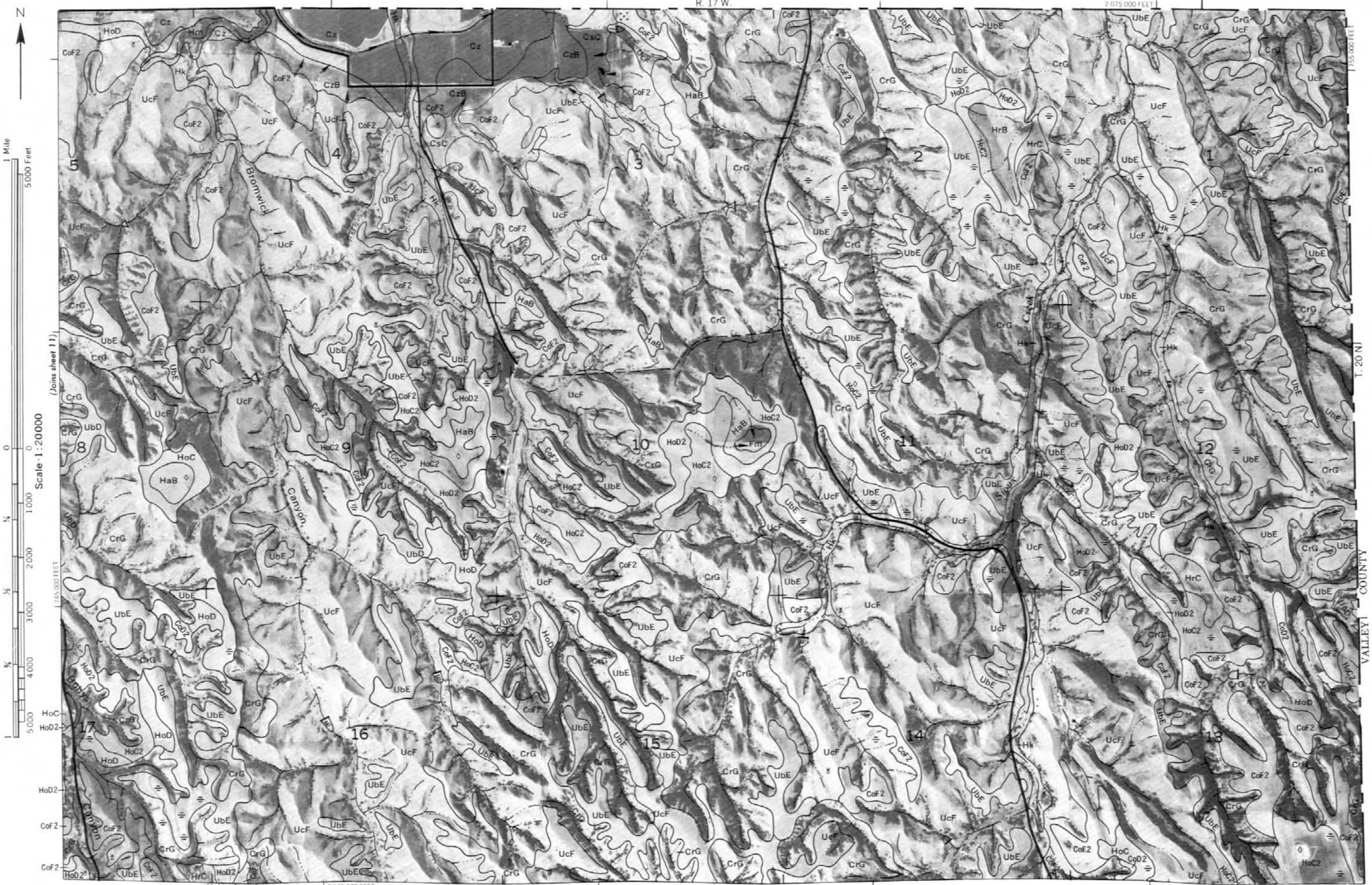

N
LOUP COUNTY
R. 20 W.
1 980 000 FEET
755 000 FEET
T. 20 N.
(Joins sheet 7)
(Joins sheet 9)
(Joins sheet 20)
745 000 FEET
1 965 000 FEET
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
¼
½
¾
1
2
3
4
5
8
9
10
11
12
13
14
15
16
17

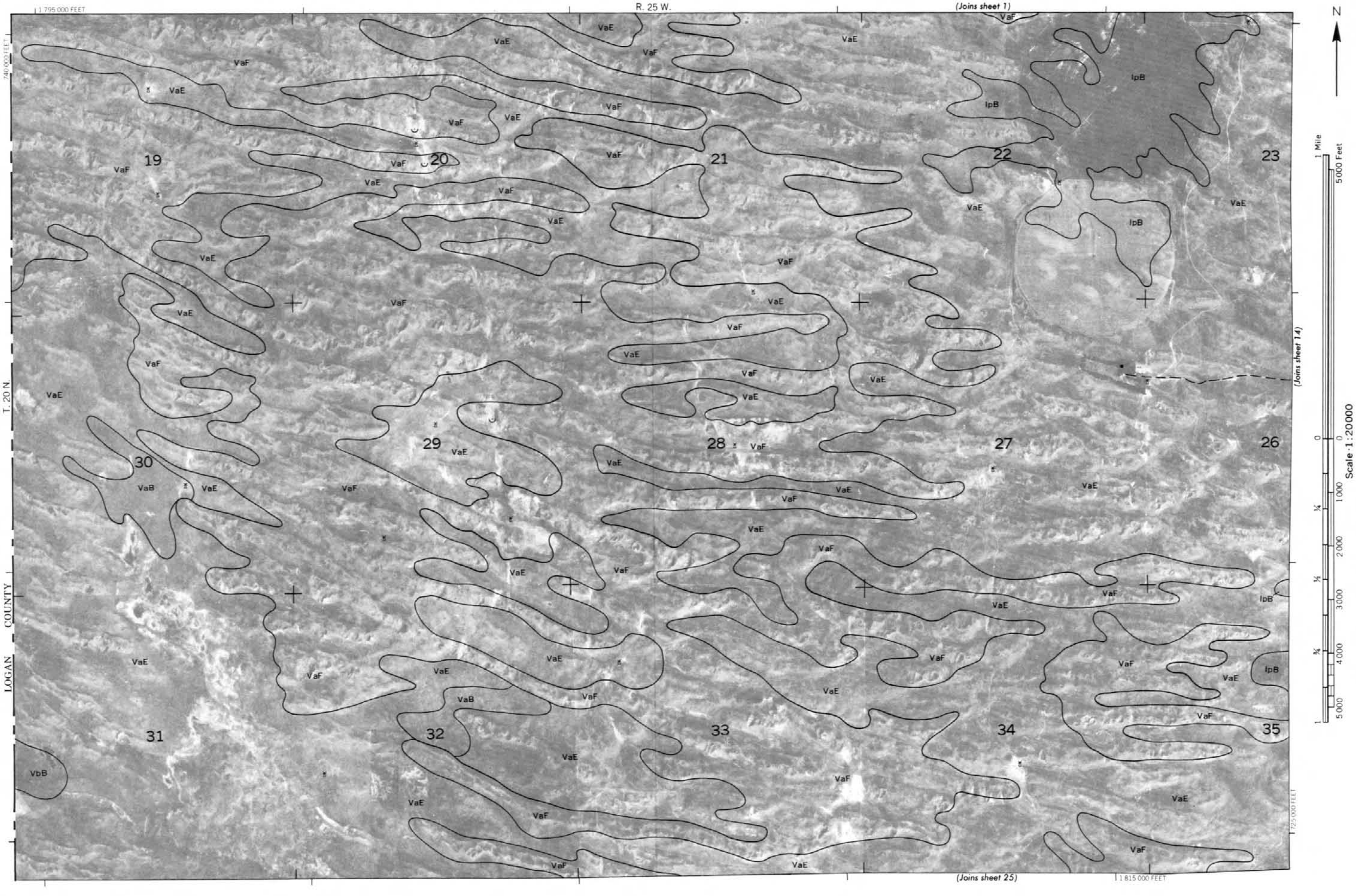

1 985 000 FEET
R. 19 W.
LOUP COUNTY
755 000 FEET
T. 20 N.
(Joins sheet 8)
(Joins sheet 10)
(Joins sheet 21)
2 005 000 FEET
740 000 FEET
N
1 Mile
5000 Feet
Scale 1:20000
Wagon Bar
Canyon
Sand
1
2
3
4
5
6
7
8
9
10
11
14
15
16
17
18

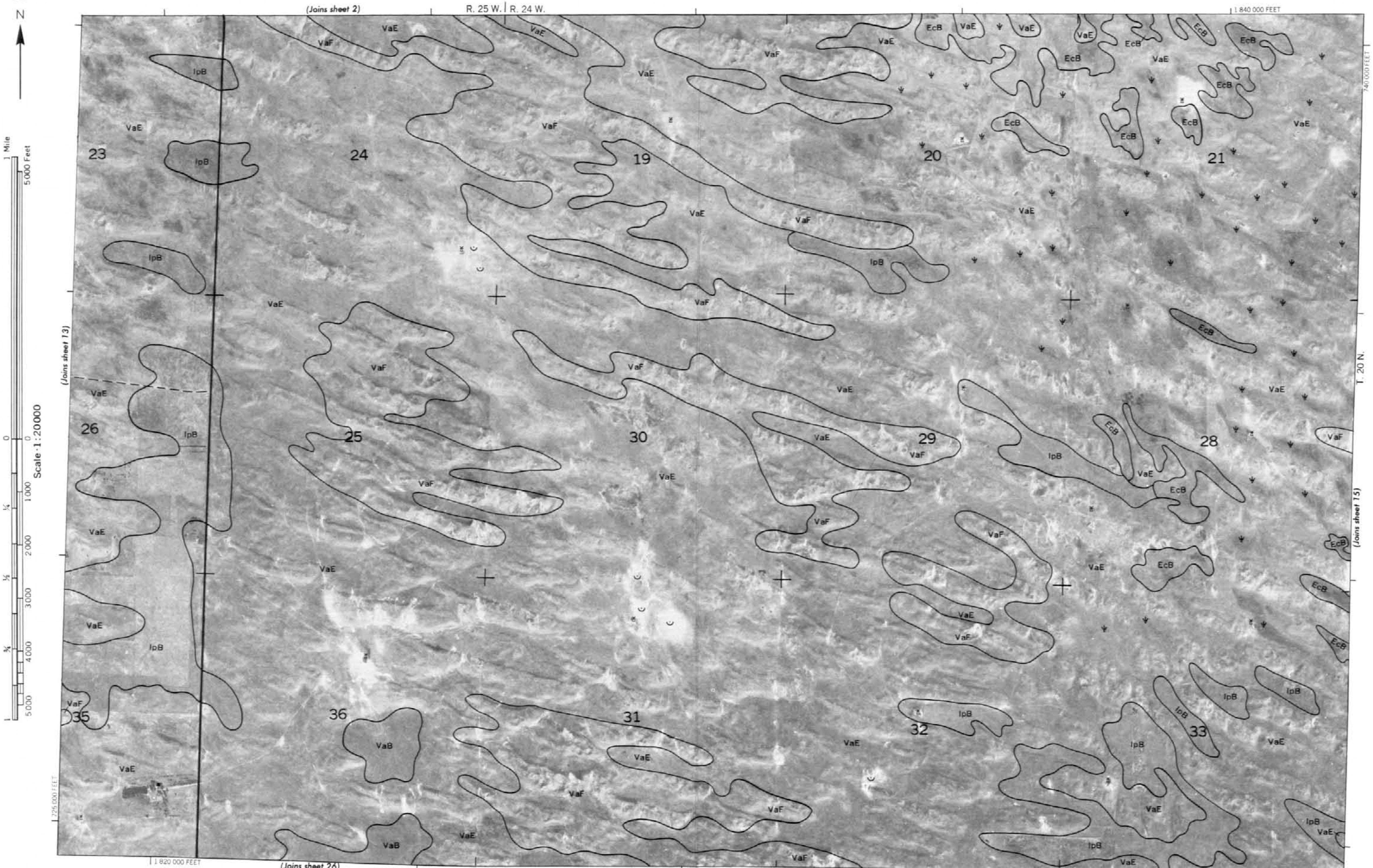
(10)

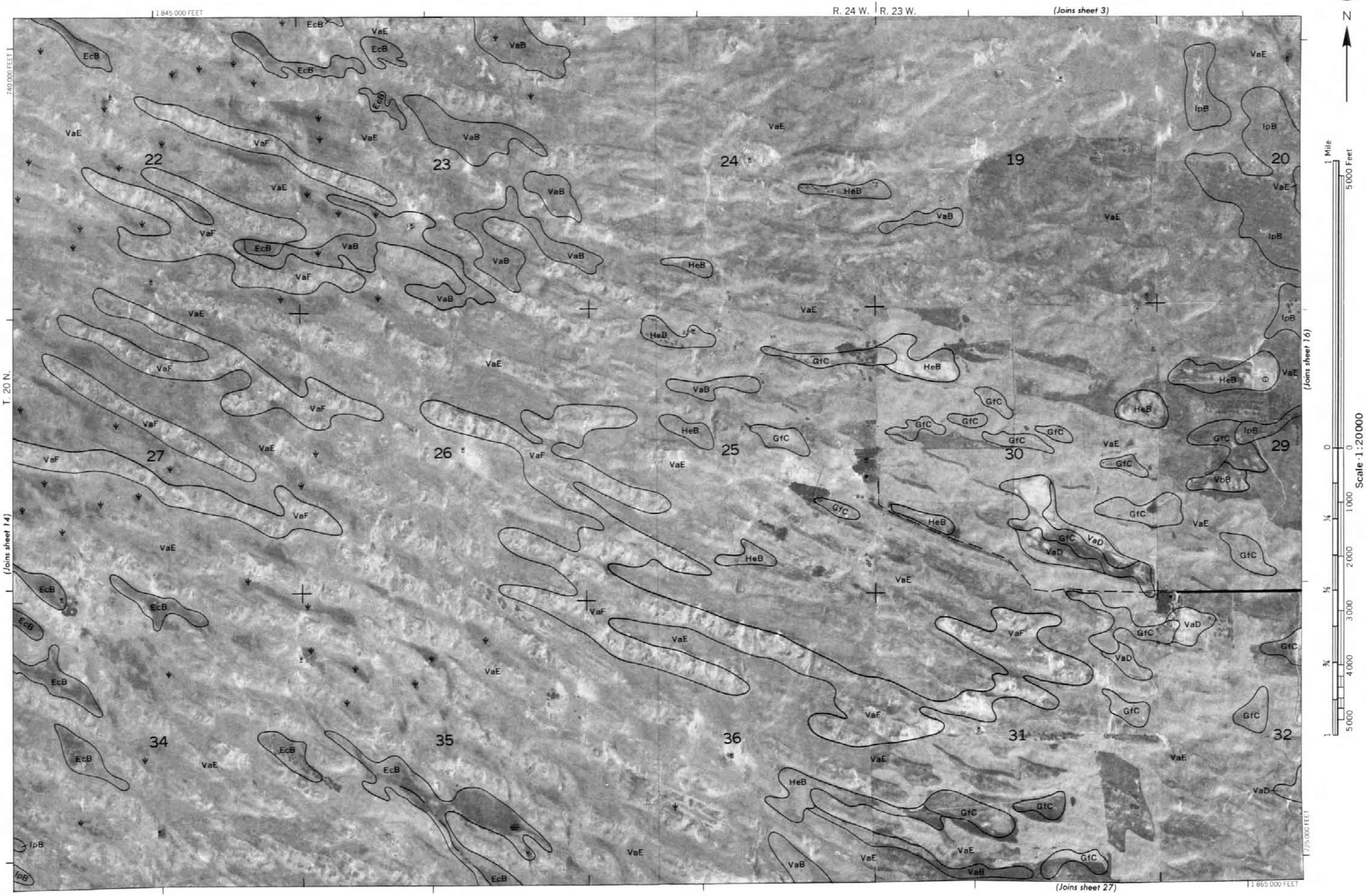

N
R. 19 W.
R. 18 W.
LOUP COUNTY
2 030 000 FEET
T. 20 N.
(Joins sheet 9)
(Joins sheet 11)
(Joins sheet 22)
2 010 000 FEET
1 Mile
5000 Feet
Scale 1:20000
Cheesbra
Canyon
Sand
Canyon


11
N
LOUP COUNTY
R. 18 W.
R. 17 W.
T. 20 N.
2 035 000 FEET
2 055 000 FEET
755 000 FEET
745 000 FEET
(Joins sheet 10)
(Joins sheet 12)
(Joins sheet 23)
McCord Canyon
Canyon
Bohy's Canyon
Loydell Canyon
183
1 Mile
5000 Feet
Scale 1:20000


LOUP COUNTY
GARFIELD COUNTY
R. 17 W.
2 075 000 FEET
755 000 FEET
T. 20 N.
VALLEY COUNTY
(Joins sheet 11)
(Joins sheet 24)
2 060 000 FEET
745 000 FEET
N
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
Bromwick
Canyon
Bohys
Canyon
Creek
Stout
1
2
3
4
5
8
9
10
11
12
13
14
15
16
17

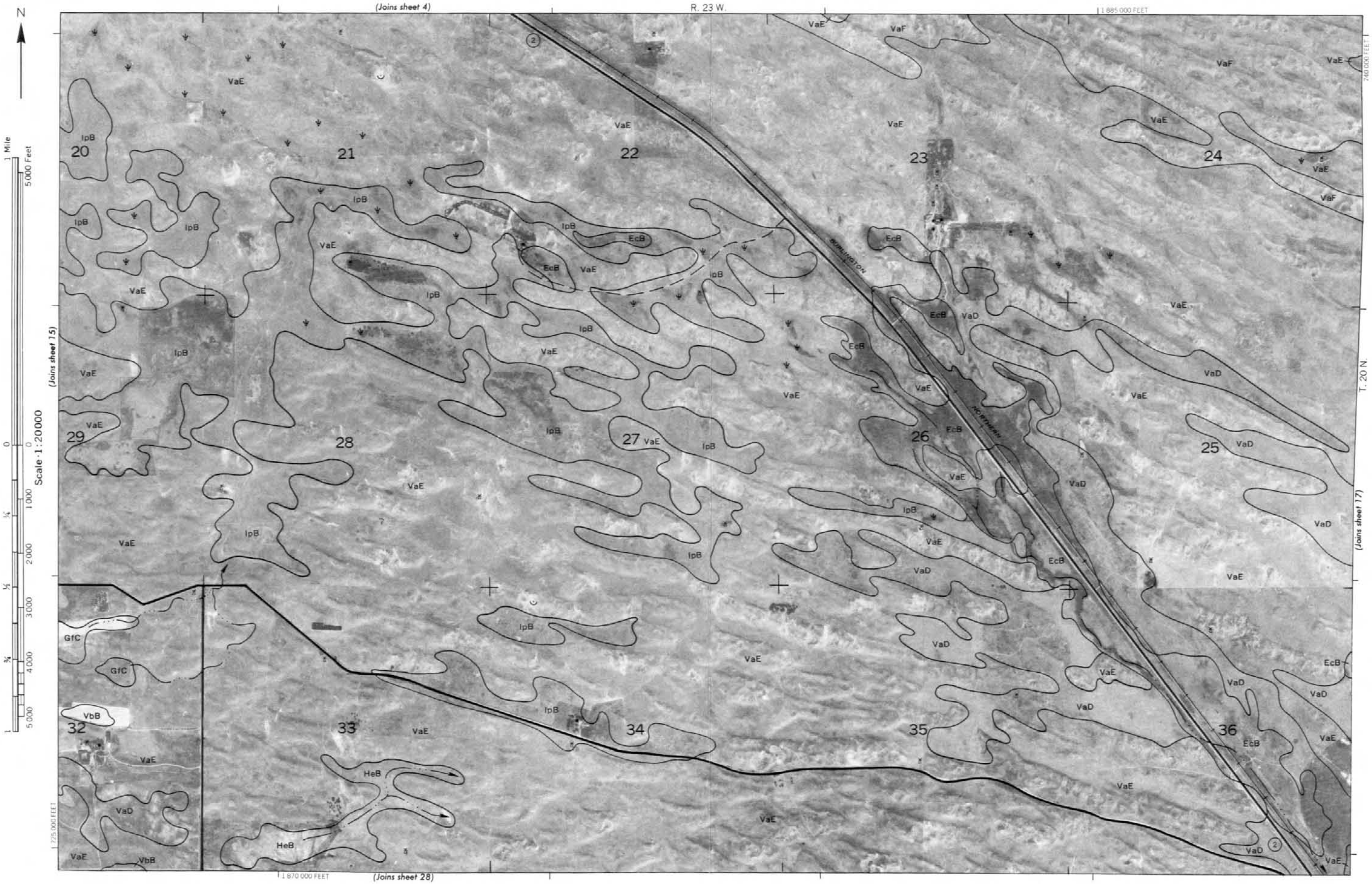

13
N
R. 25 W.
(Joins sheet 1)
(Joins sheet 14)
(Joins sheet 25)
T. 20 N.
LOGAN COUNTY
1 795 000 FEET
740 000 FEET
725 000 FEET
1 815 000 FEET
19
20
21
22
23
26
27
28
29
30
31
32
33
34
35
VaE
VaF
VaB
VbB
IpB
1 Mile
5000 Feet
0
1000
2000
3000
4000
5000
Scale 1:20000

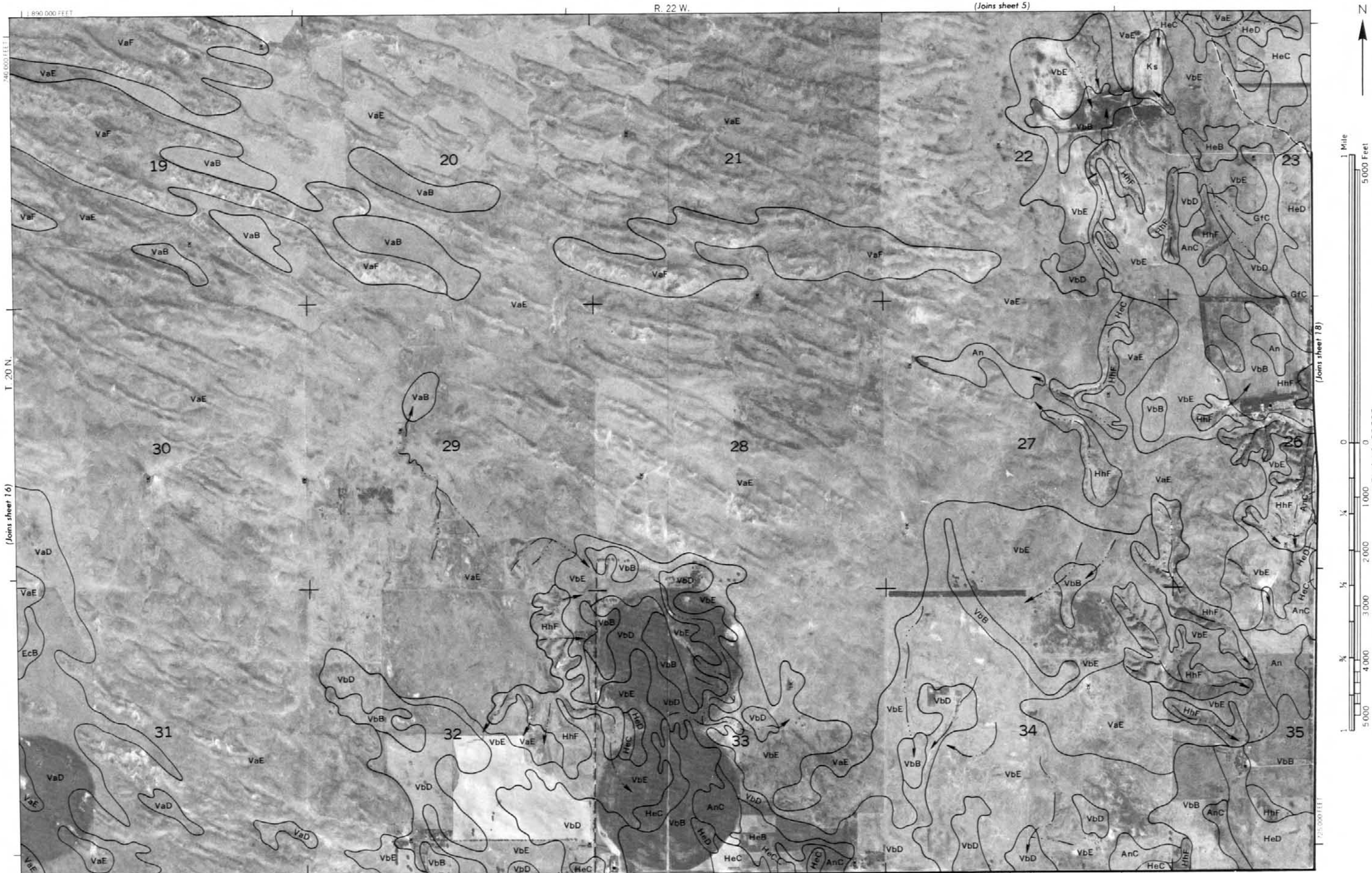

N
1 Mile
5 000 Feet
Scale 1:20000
0
1 000
2 000
3 000
4 000
5 000
(Joins sheet 2)
R. 25 W.
R. 24 W.
1 840 000 FEET
740 000 FEET
T. 20 N.
(Joins sheet 13)
(Joins sheet 15)
(Joins sheet 26)
1 820 000 FEET
725 000 FEET
19
20
21
23
24
25
26
28
29
30
31
32
33
35
36
VaE
VaF
VaB
IpB
EcB



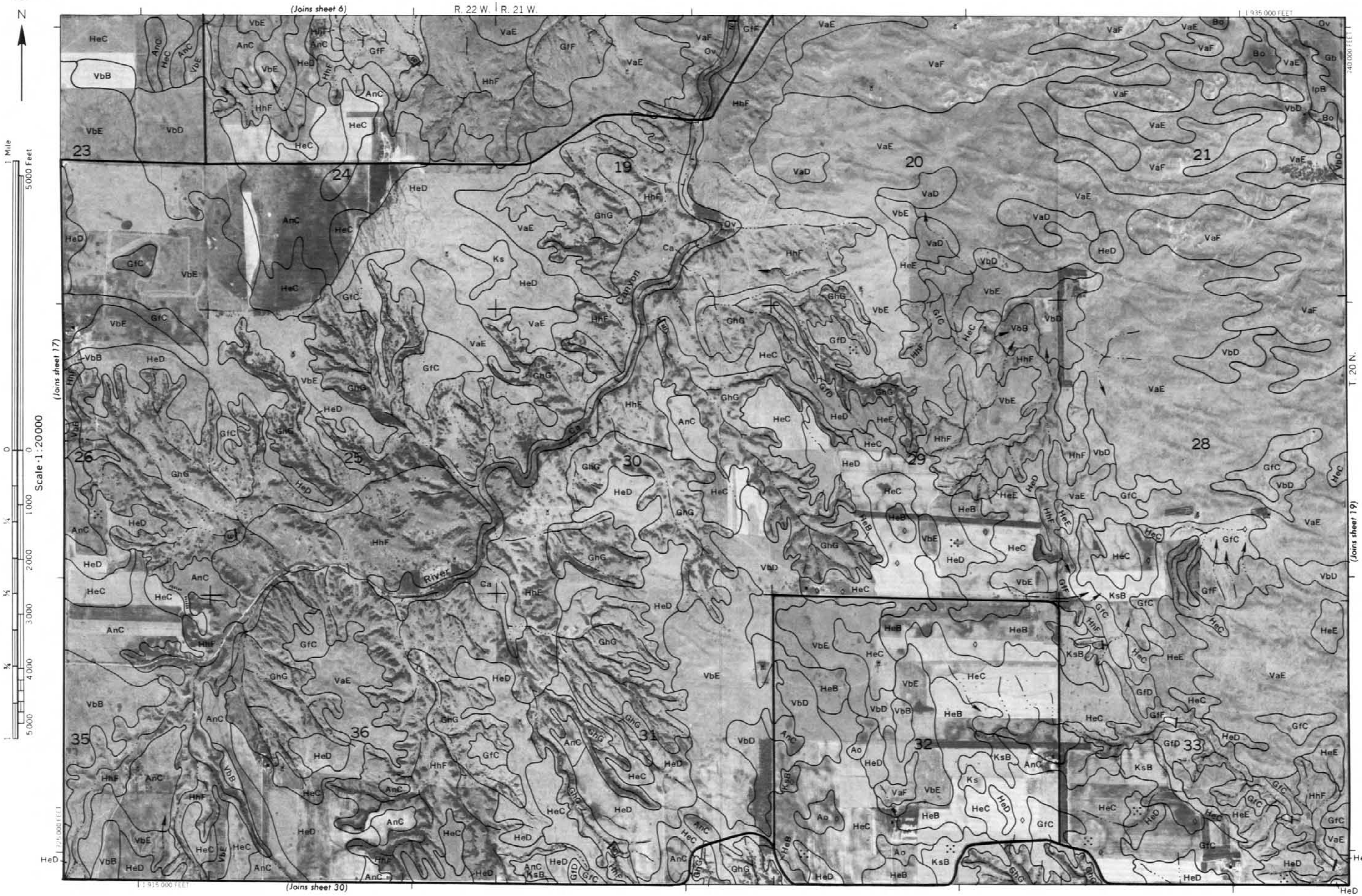
(Joins sheet 3)
(Joins sheet 14)
(Joins sheet 16)
(Joins sheet 27)
R. 24 W.
R. 23 W.
T. 20 N.
1 845 000 FEET
1 865 000 FEET
740 000 FEET
725 000 FEET
N
1 Mile
5000 Feet
Scale 1:20000
22
23
24
19
20
27
26
25
30
29
34
35
36
31
32
VaE
VaF
VaB
VaD
EcB
HeB
GfC
IpB
VbB

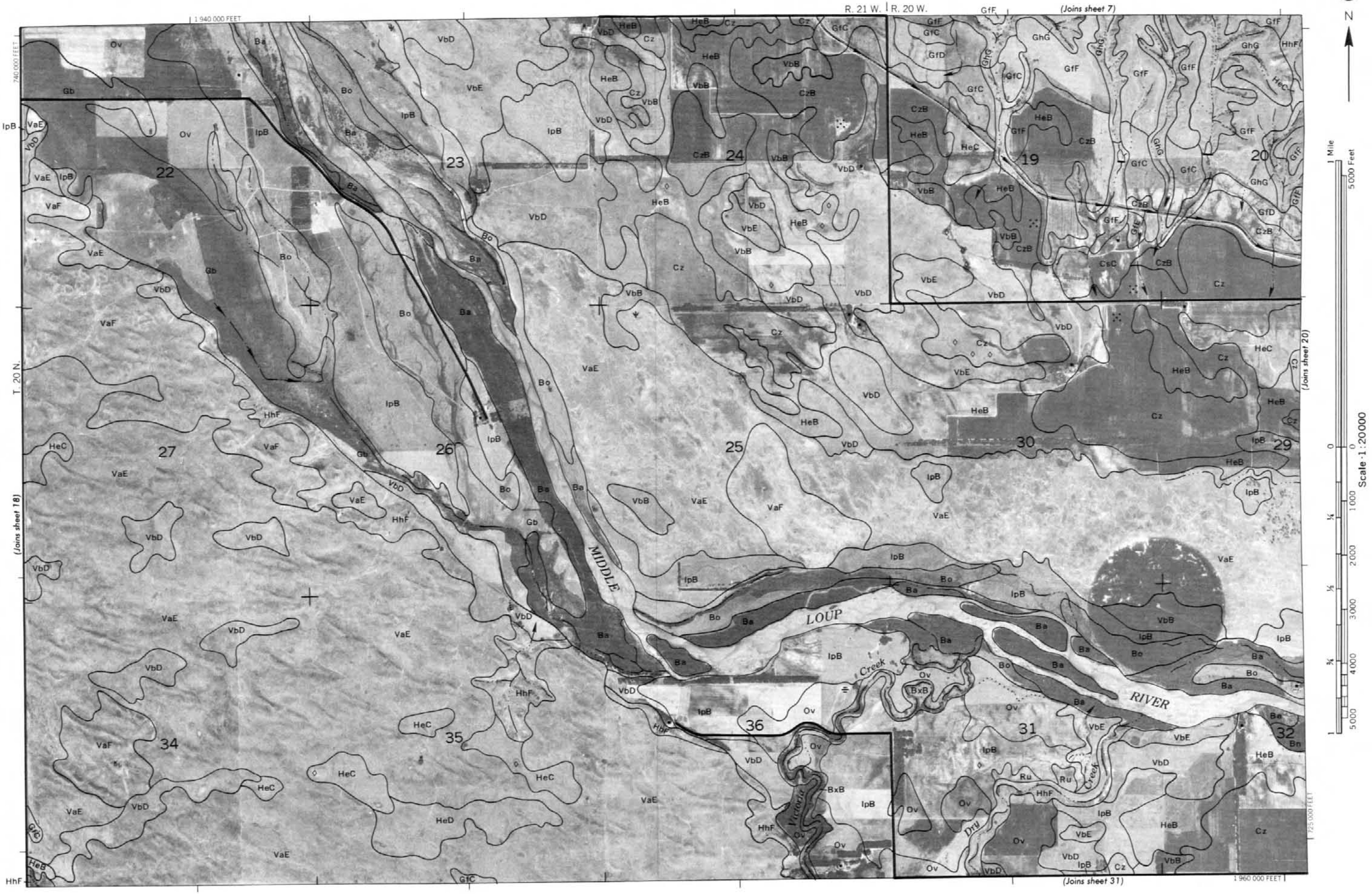
CUSTER COUNTY, NEBRASKA — SHEET NUMBER 16

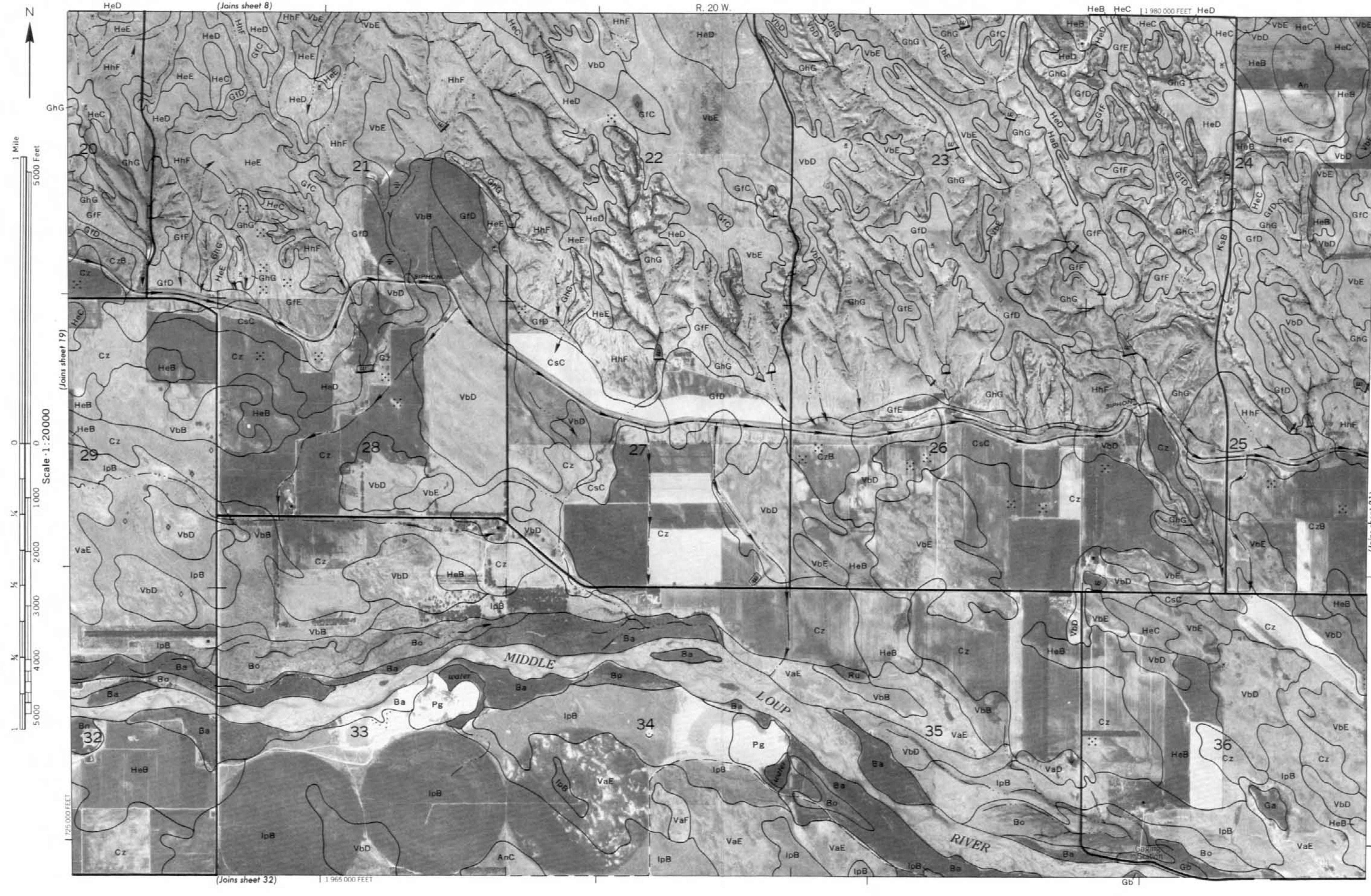


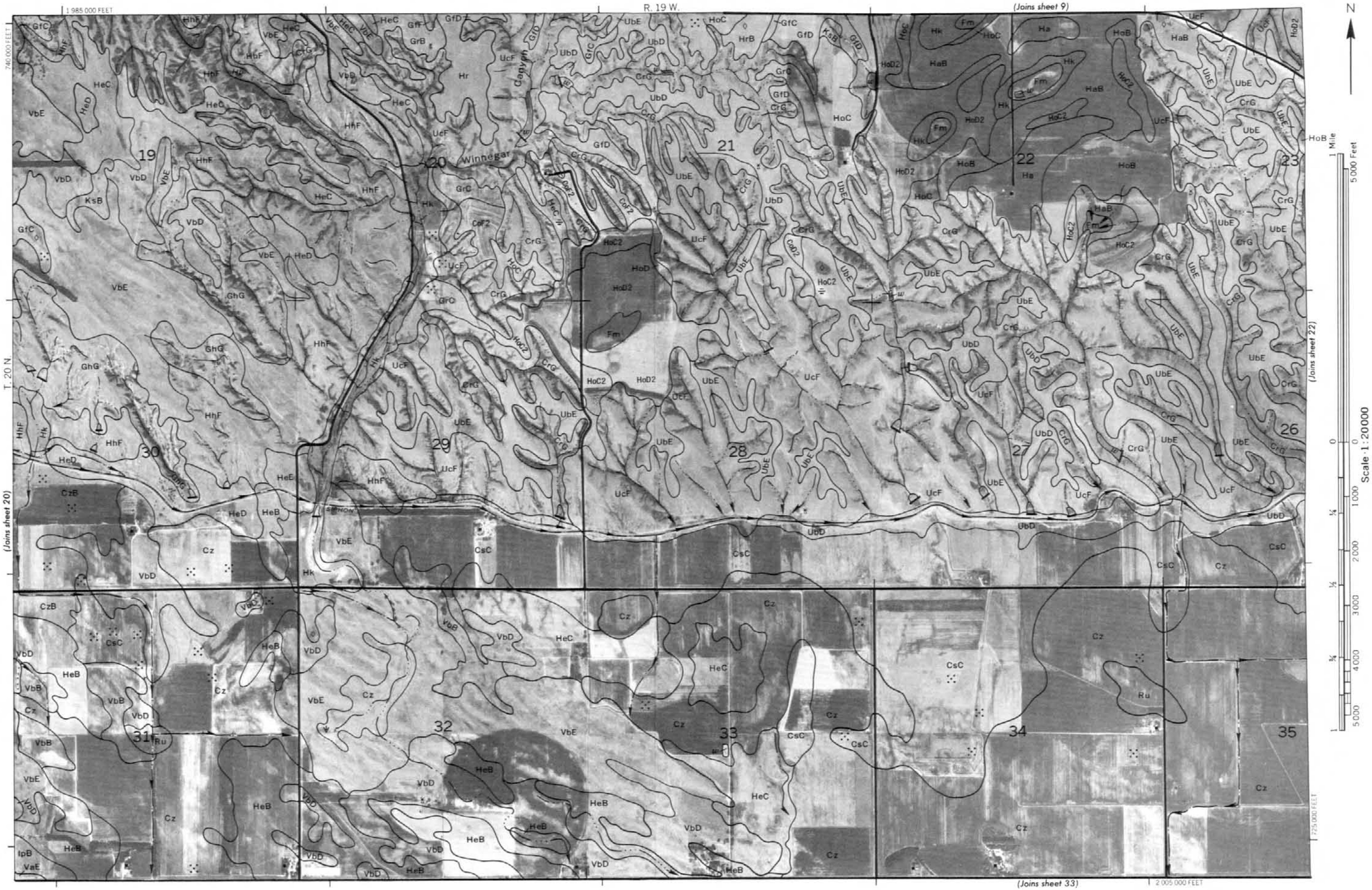

R. 22 W.
(Joins sheet 5)
(Joins sheet 18)
(Joins sheet 29)
(Joins sheet 16)
T. 20 N.
1 890 000 FEET
1 910 000 FEET
N
19
20
21
22
23
30
29
28
27
26
31
32
33
34
35
VaF
VaE
VaB
VaD
VbE
VbB
VbD
HeC
HeD
HeB
HhF
AnC
An
GfC
Ks
EcB
1 Mile
5000 Feet
Scale 1:20000

CUSTER COUNTY, NEBRASKA — SHEET NUMBER 18




N
R. 21 W.
R. 20 W.
(Joins sheet 7)
(Joins sheet 20)
(Joins sheet 31)
(Joins sheet 18)
T. 20 N.
1 940 000 FEET
740 000 FEET
725 000 FEET
1 960 000 FEET
22
23
24
19
20
27
26
25
30
29
34
35
36
31
32
MIDDLE
LOUP
RIVER
Creek
Victoria
Dry
Creek
1 Mile
5000 Feet
Scale 1:20000
0
¼
½
¾
1
1000
2000
3000
4000
5000

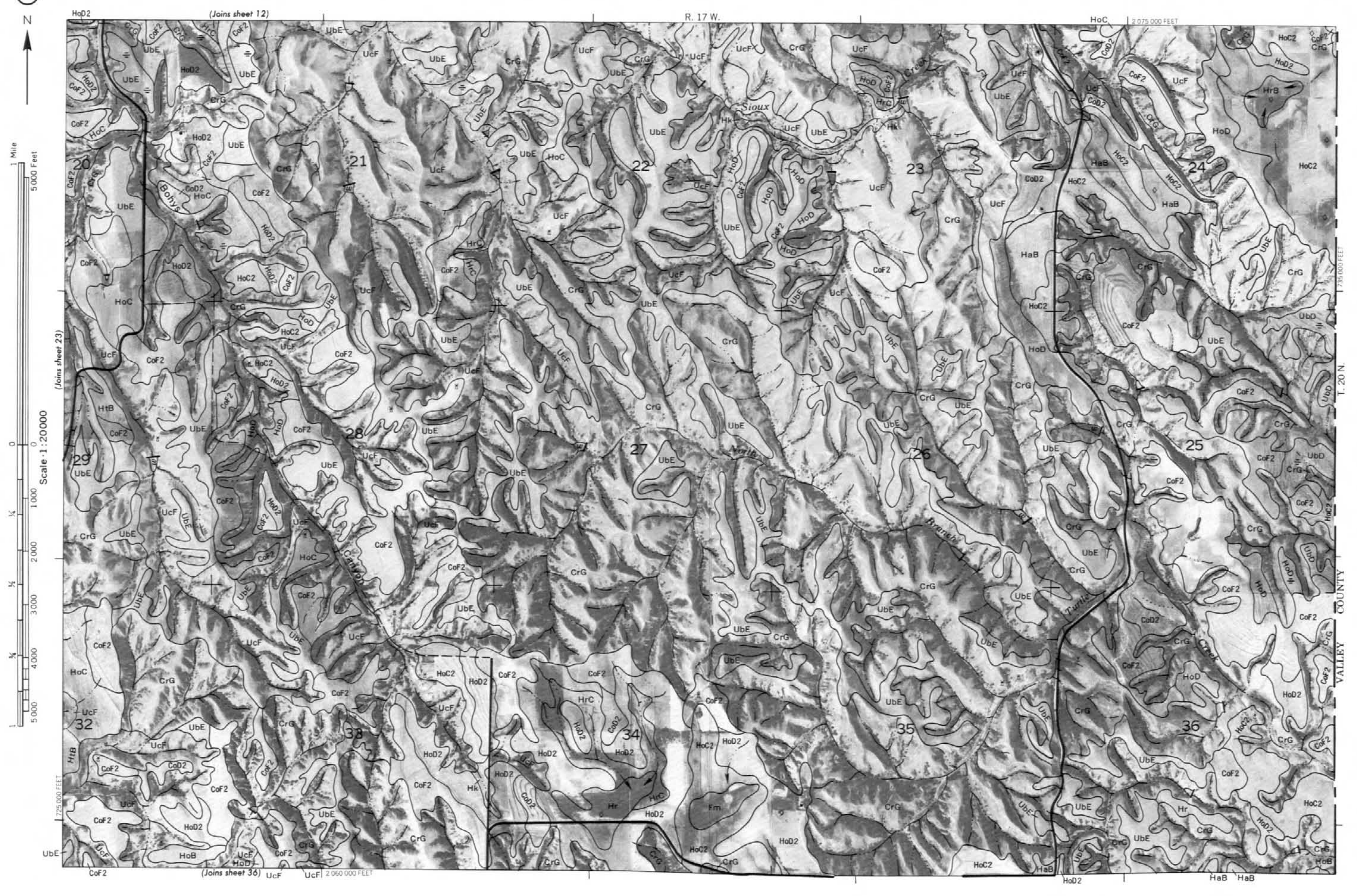

N
(Joins sheet 8)
R. 20 W.
1 980 000 FEET
740 000 FEET
T. 20 N.
(Joins sheet 19)
(Joins sheet 21)
(Joins sheet 32)
1 965 000 FEET
725 000 FEET
Scale 1:20000
1 Mile
5000 Feet
MIDDLE
LOUP
RIVER
SIPHON
water
20
21
22
23
24
29
28
27
26
25
32
33
34
35
36


1 985 000 FEET
R. 19 W.
(Joins sheet 9)
740 000 FEET
T. 20 N.
(Joins sheet 20)
(Joins sheet 22)
(Joins sheet 33)
2 005 000 FEET
725 000 FEET
Winnegar
19
20
21
22
23
30
29
28
27
26
31
32
33
34
35
N
1 Mile
5000 Feet
0
1000
2000
3000
4000
5000
¼
½
¾
1
Scale 1:20000

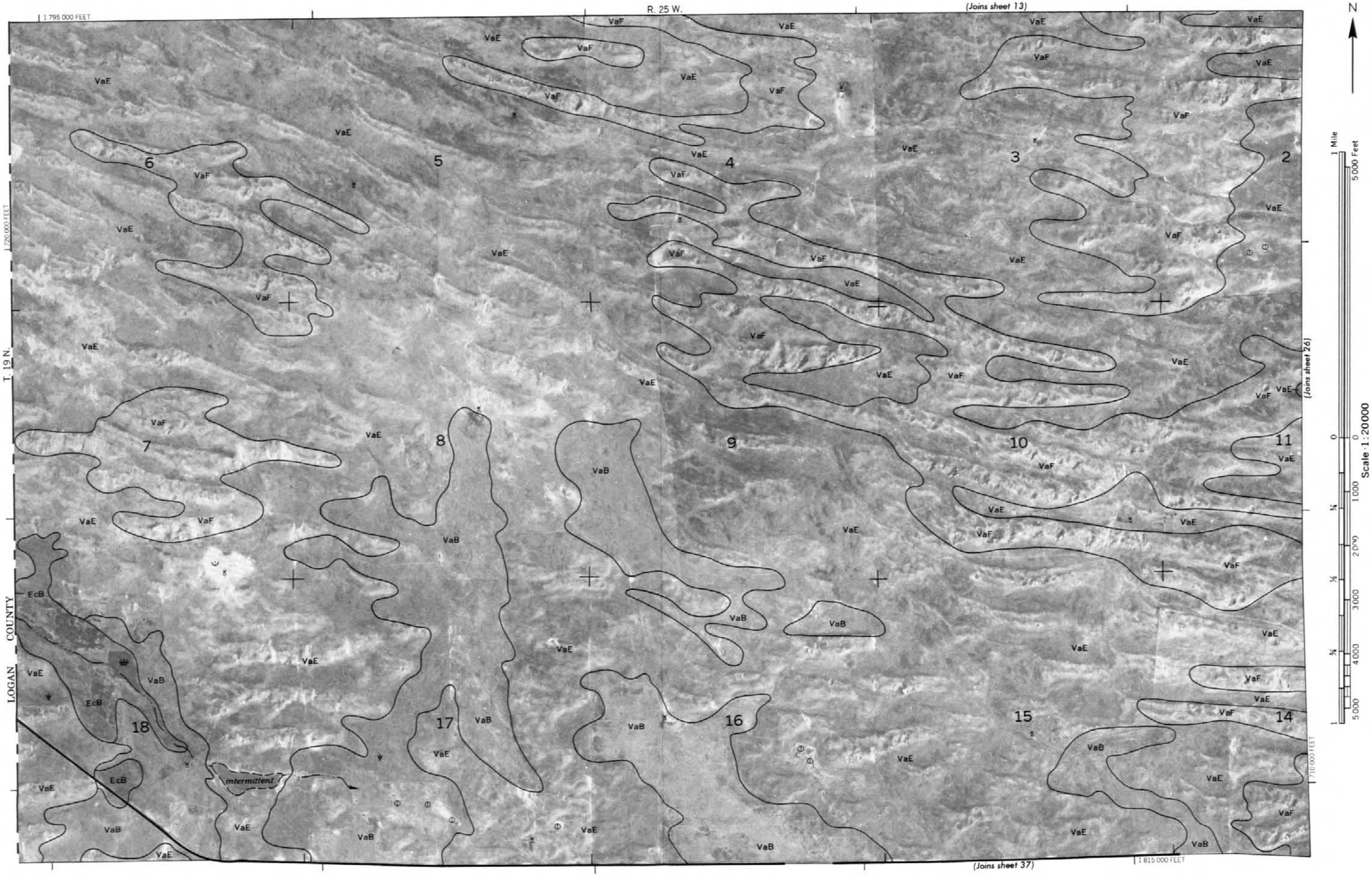

N
1 Mile
5000 Feet
Scale 1:20000
(Joins sheet 10)
R. 19 W.
R. 18 W.
2 030 000 FEET
740 000 FEET
(Joins sheet 21)
(Joins sheet 23)
(Joins sheet 34)
T. 20 N.
2 010 000 FEET
725 000 FEET
Sand Canyon
Creek
Sand Creek
SIPHON
NEW UNION CEMETERY
SAINT MARYS CEMETERY
MOUNT HOPE CEMETERY
19
20
21
23
24
25
26
28
29
30
31
32
33
35
36

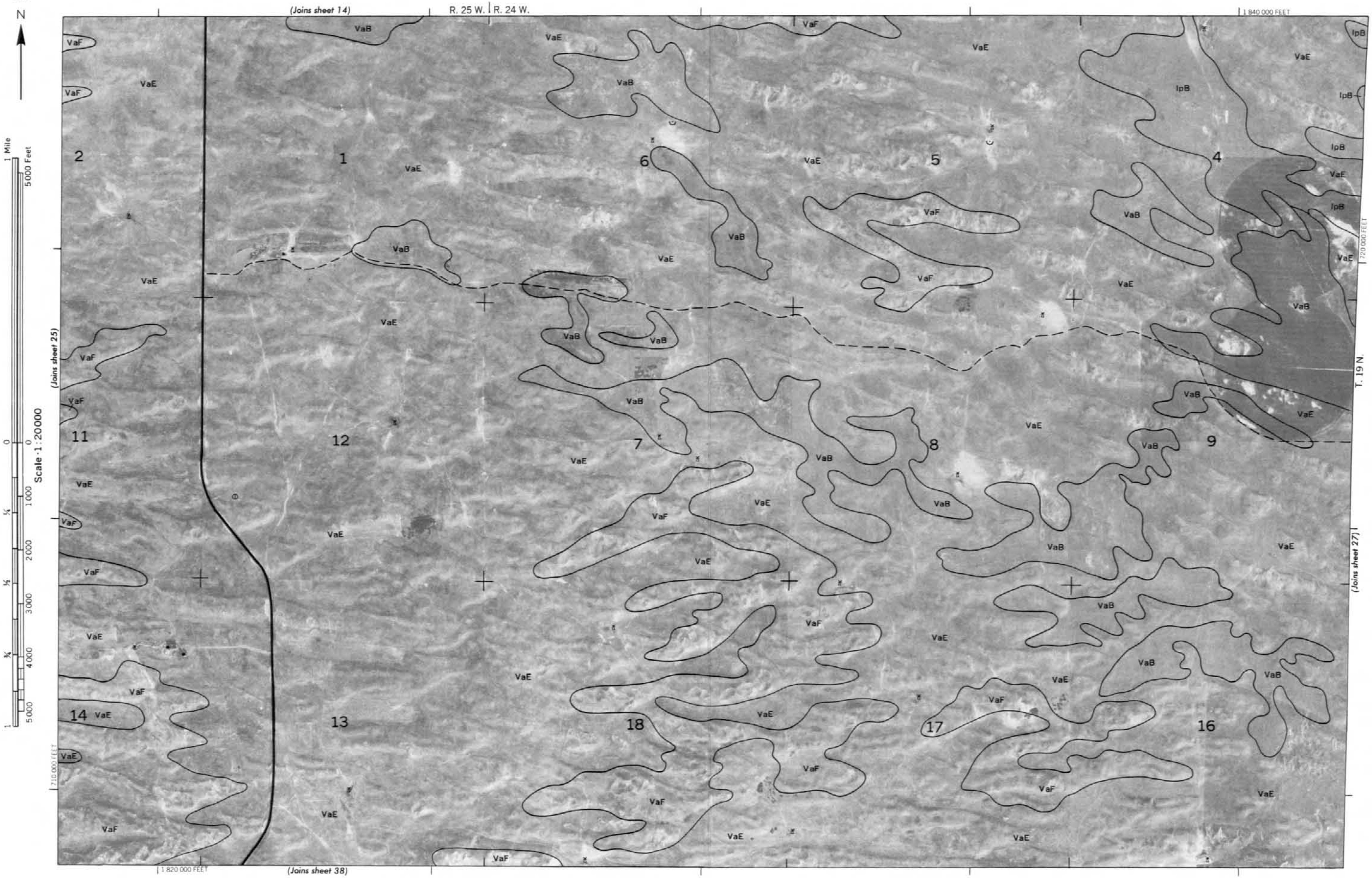

(Joins sheet 11)
(Joins sheet 24)
(Joins sheet 35)
(Joins sheet 22)
R. 18 W.
R. 17 W.
T. 20 N.
2 035 000 FEET
740 000 FEET
725 000 FEET
2 055 000 FEET
Divide
Hill
SIPHON
183
N
1 Mile
5000 Feet
Scale 1:20000
0
¼
½
¾
1
1000
2000
3000
4000
5000

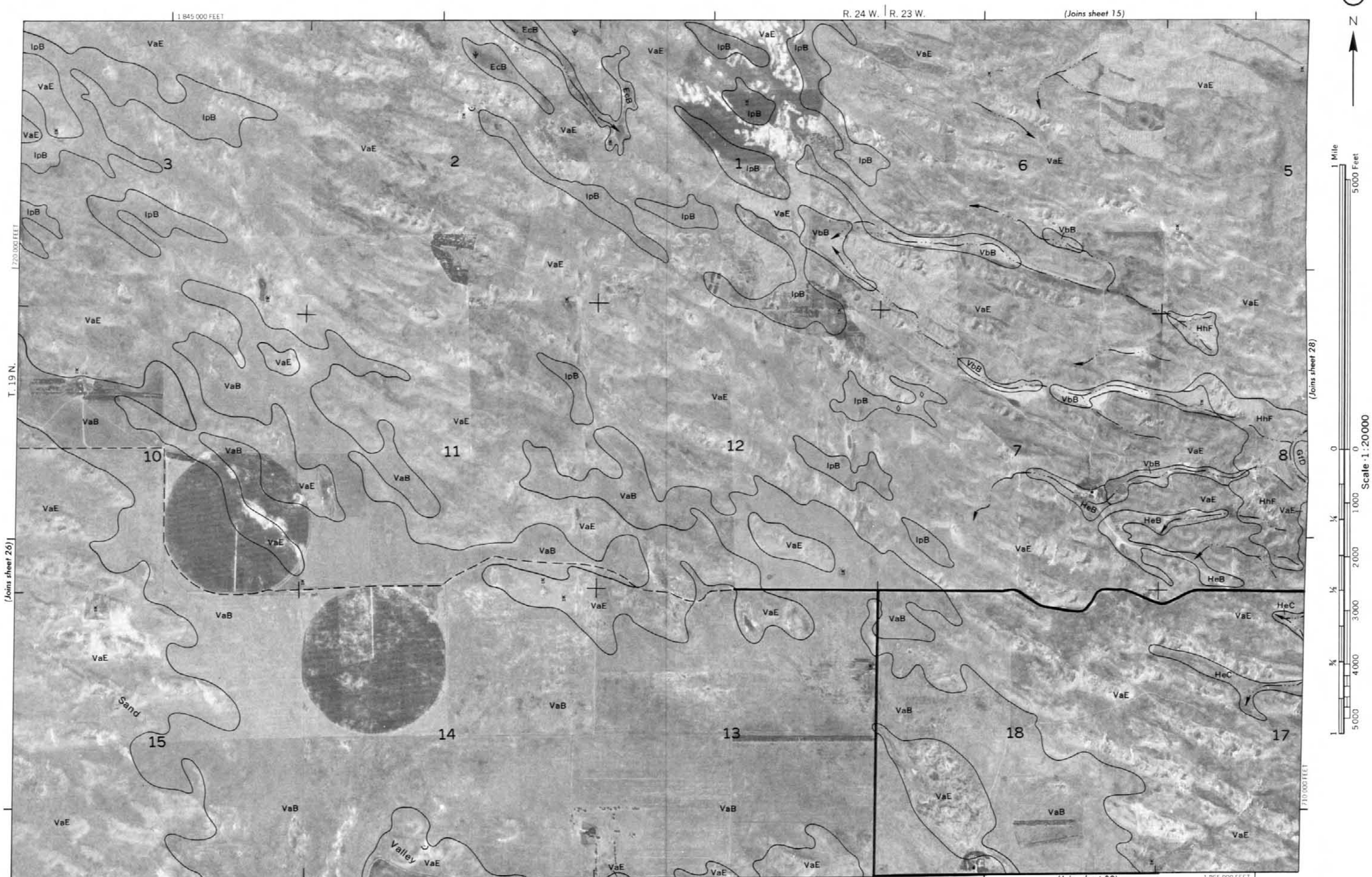
CUSTER COUNTY, NEBRASKA — SHEET NUMBER 24

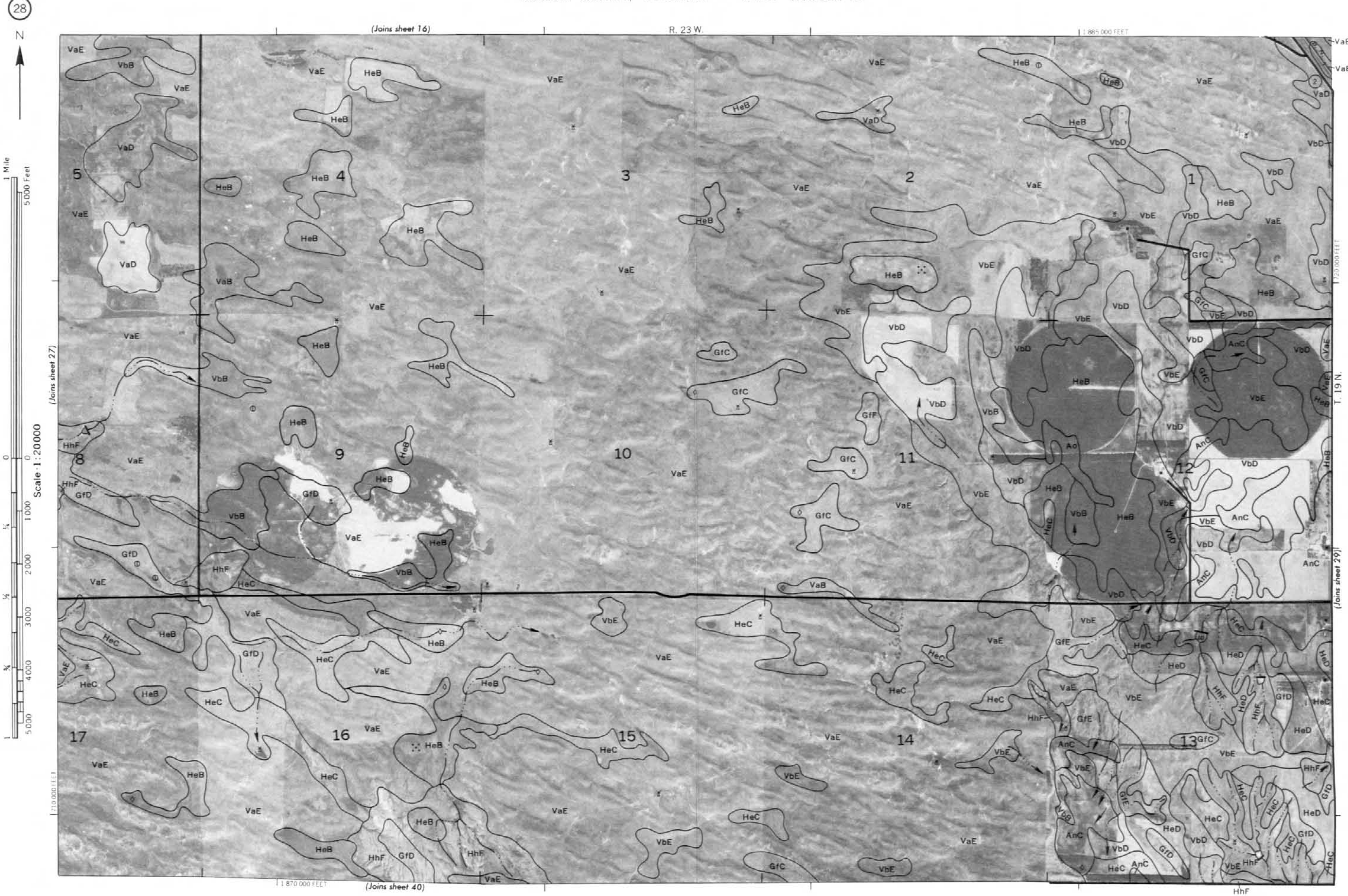


CUSTER COUNTY, NEBRASKA — SHEET NUMBER 25



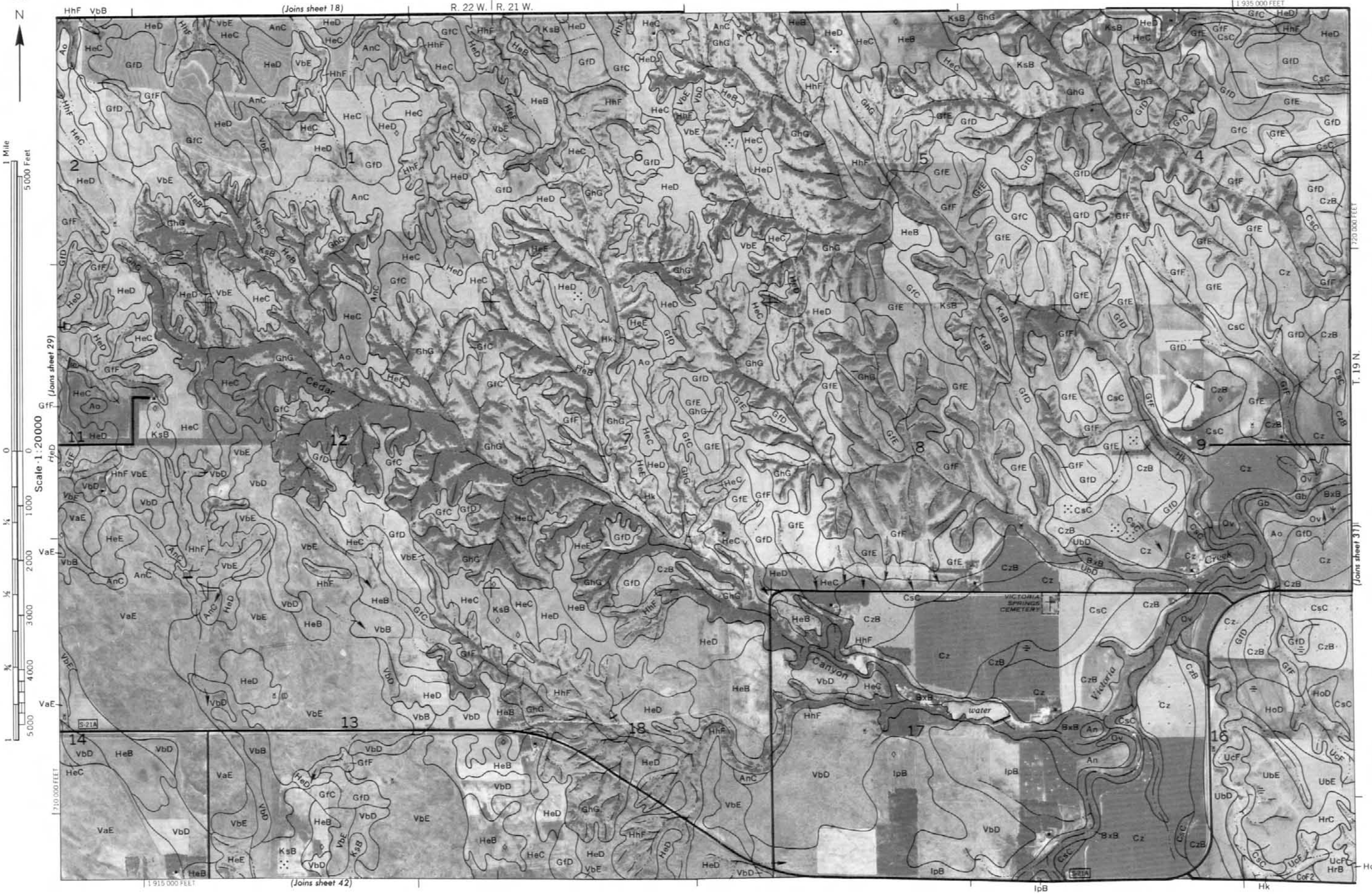

26
N
(Joins sheet 14)
R. 25 W.
R. 24 W.
1 840 000 FEET
(Joins sheet 25)
(Joins sheet 27)
(Joins sheet 38)
1 820 000 FEET
720 000 FEET
710 000 FEET
T. 19 N.
Scale 1:20000
1 Mile
5000 Feet
VaB
VaE
VaF
IpB
1
2
4
5
6
7
8
9
11
12
13
14
16
17
18

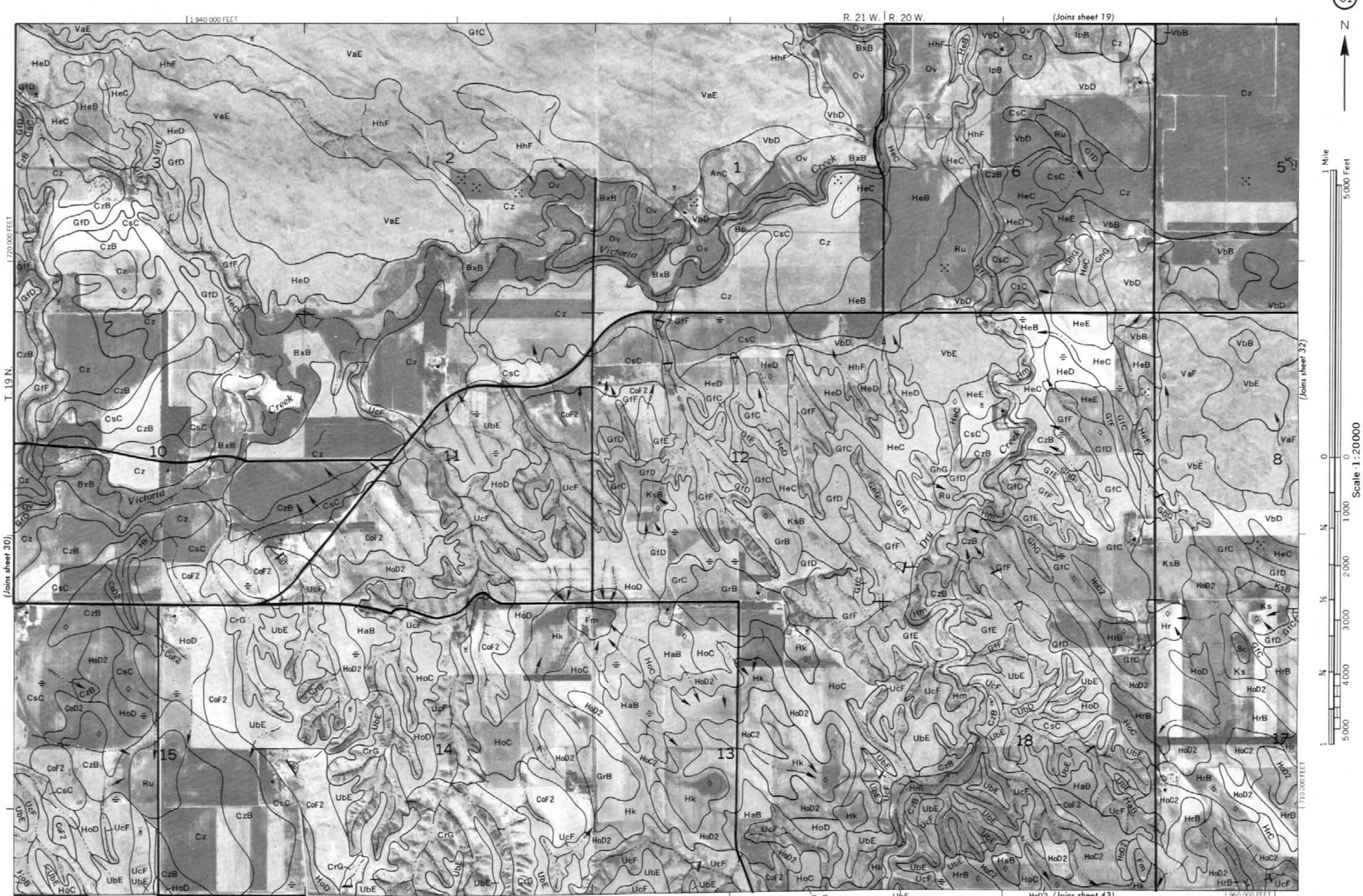

1 845 000 FEET
R. 24 W.
R. 23 W.
(Joins sheet 15)
N
720 000 FEET
T. 19 N.
(Joins sheet 26)
(Joins sheet 28)
(Joins sheet 39)
710 000 FEET
1 865 000 FEET
1 Mile
5000 Feet
Scale 1:20000
1
2
3
5
6
7
8
10
11
12
13
14
15
17
18
IpB
VaE
VaB
EcB
VbB
HhF
HeB
HeC
GtD
Sand
Valley



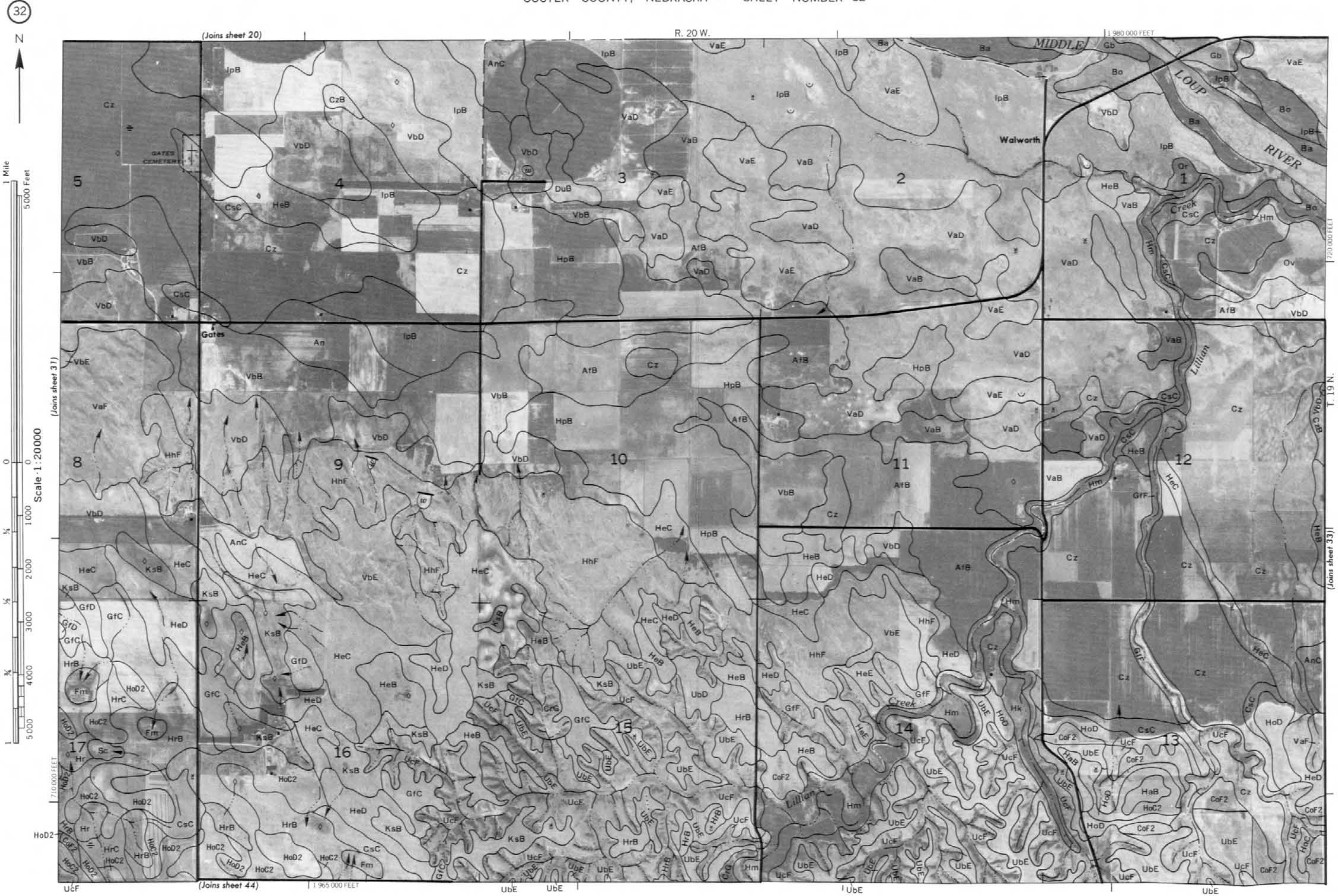
28
N
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
0
¼
½
¾
1
(Joins sheet 16)
R. 23 W.
1 885 000 FEET
(Joins sheet 27)
(Joins sheet 29)
(Joins sheet 40)
1 870 000 FEET
T. 19 N.
220 000 FEET
210 000 FEET
1
2
3
4
5
8
9
10
11
12
13
14
15
16
17
VaE
VaD
VaB
VbB
VbD
VbE
HeB
HeC
HeD
HhF
GfC
GfD
GfE
GfF
AnC
Ao

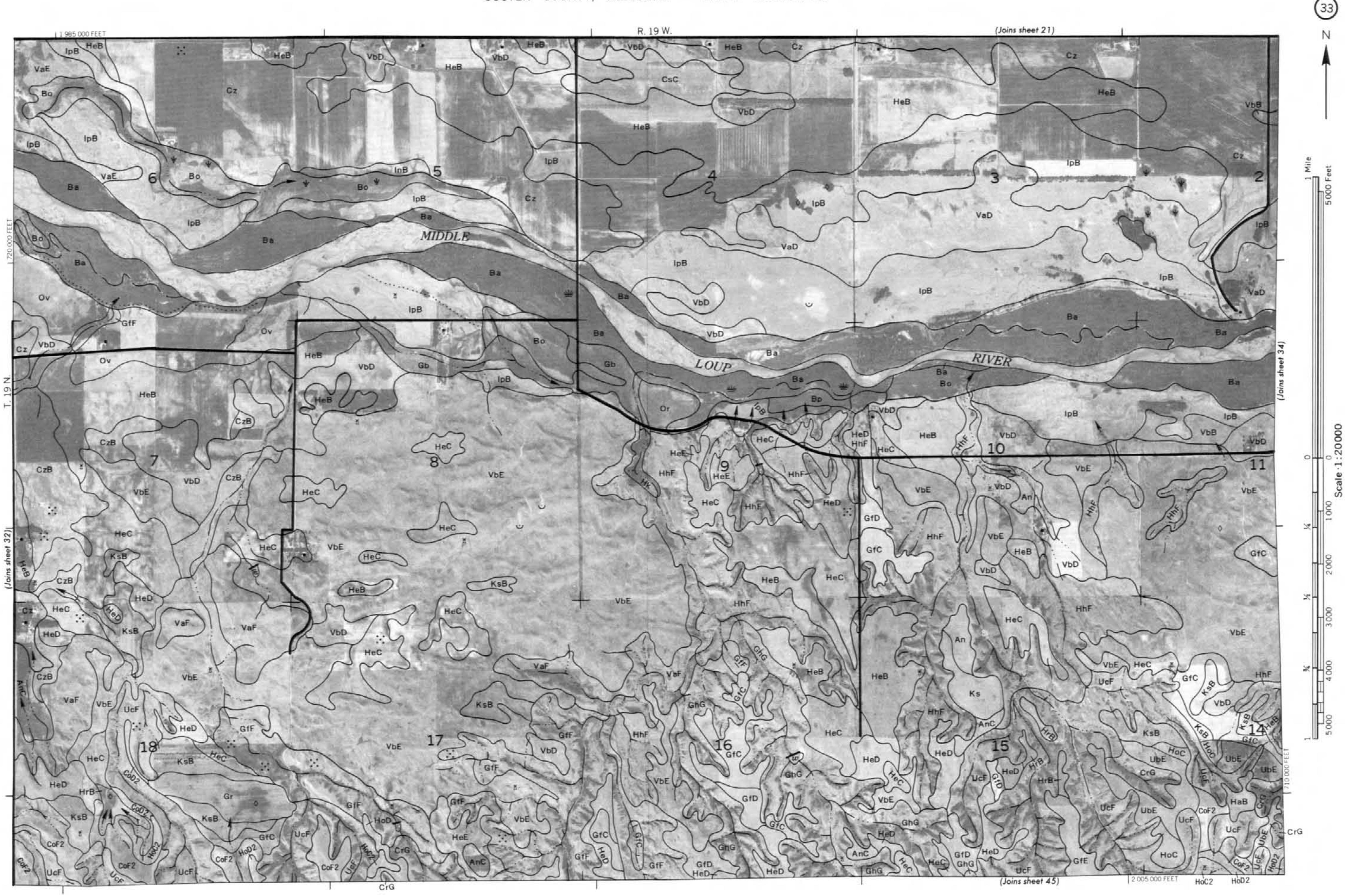

29
N
1 890 000 FEET
R. 22 W.
(Joins sheet 17)
720 000 FEET
T. 19 N.
(Joins sheet 28)
(Joins sheet 30)
(Joins sheet 41)
1 910 000 FEET
710 000 FEET
BURLINGTON
NORTHERN
Anselmo
SAINT ANSELMS CEMETERY
S-21A
2
3
4
5
6
7
8
9
10
11
14
15
16
17
18
1 Mile
5000 Feet
0
¼
½
¾
1
0
1000
2000
3000
4000
5000
Scale 1:20000


N
(Joins sheet 18)
R. 22 W.
R. 21 W.
1 935 000 FEET
720 000 FEET
T. 19 N.
(Joins sheet 31)
(Joins sheet 29)
(Joins sheet 42)
1 915 000 FEET
710 000 FEET
1 Mile
5000 Feet
Scale 1:20000
Cedar
Canyon
Creek
Victoria
VICTORIA SPRINGS CEMETERY
water
S-21A
1
2
4
5
6
7
8
9
11
12
13
14
16
17
18

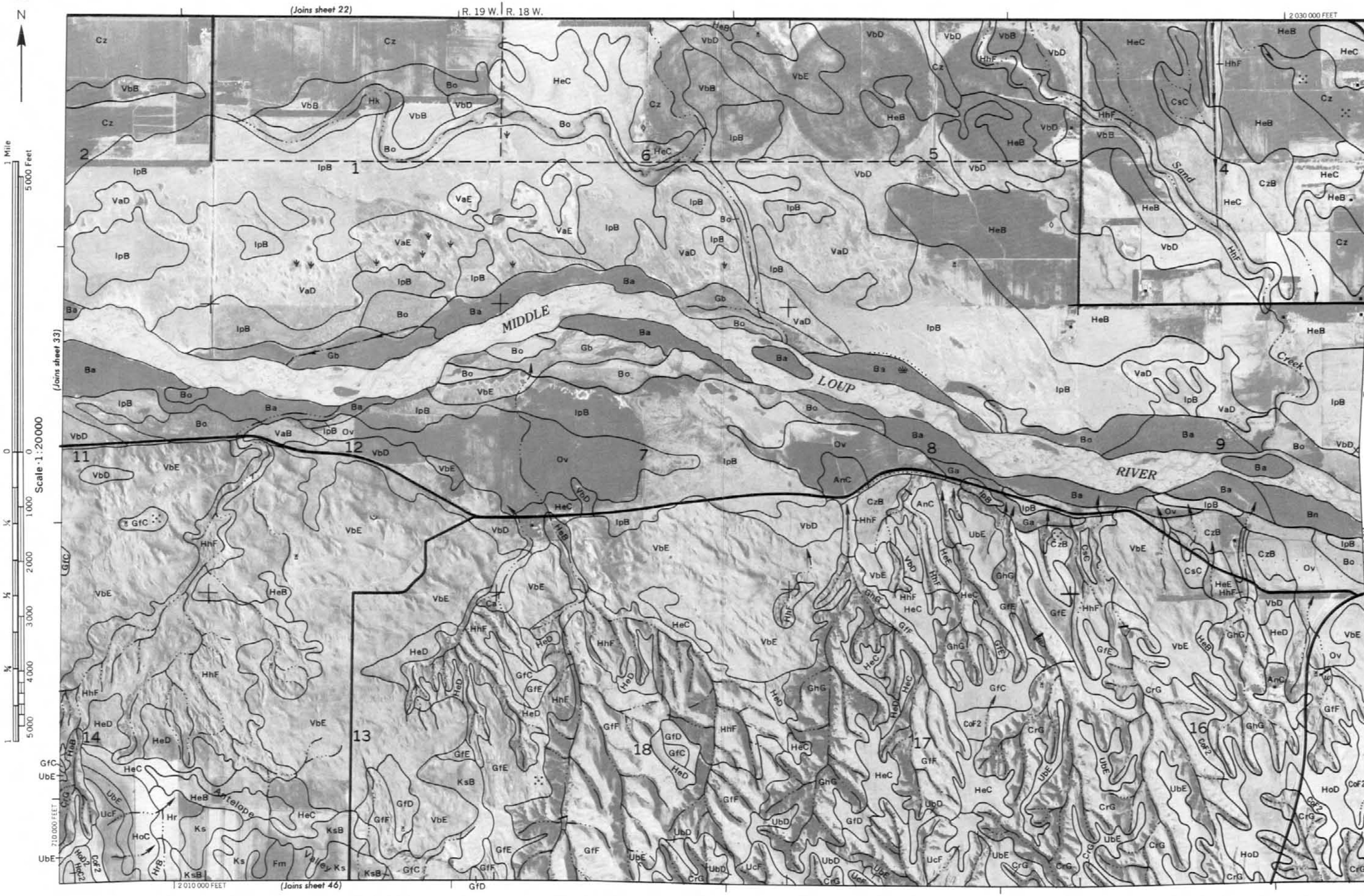


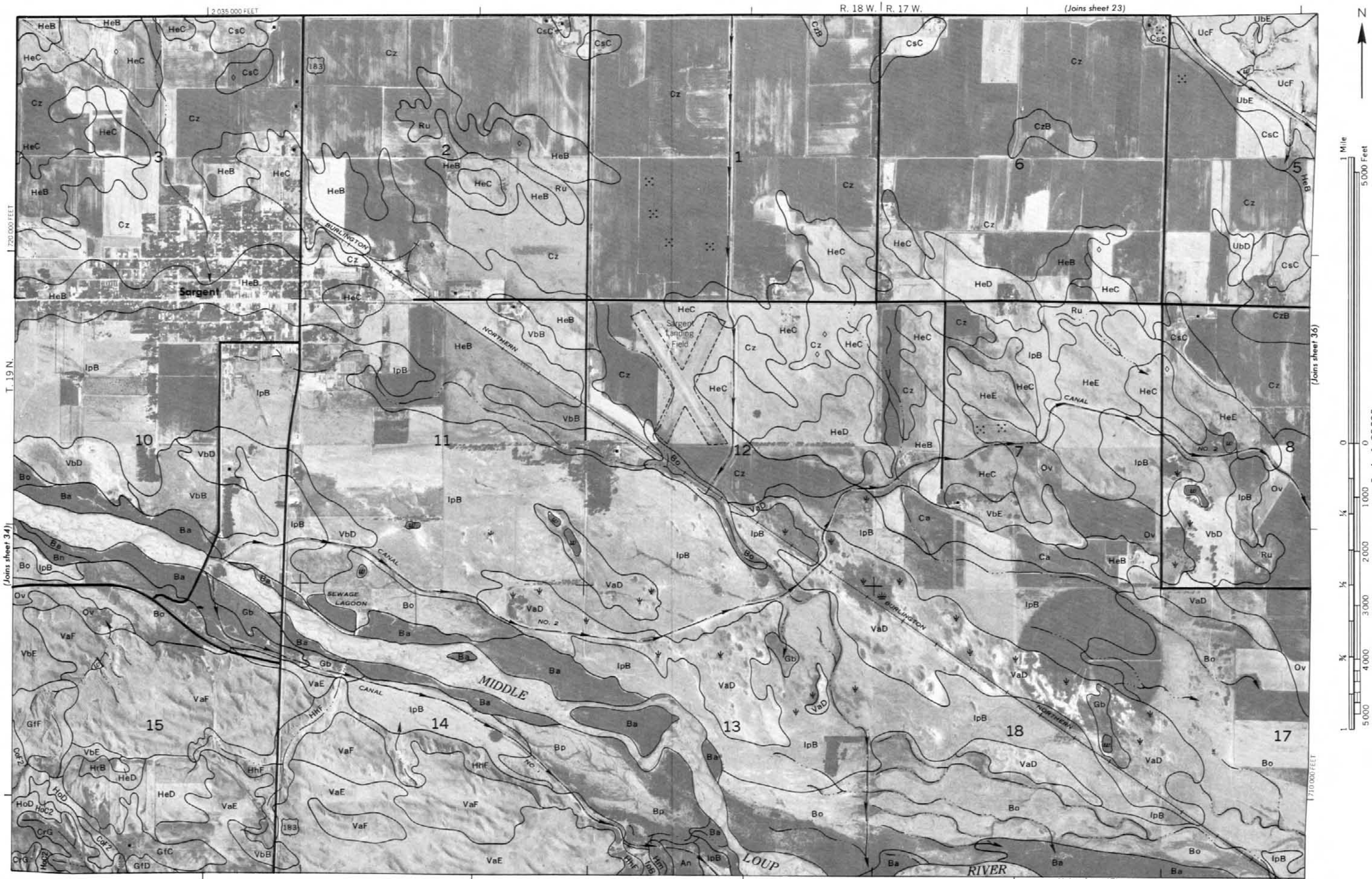
31
N
1 940 000 FEET
R. 21 W.
R. 20 W.
(Joins sheet 19)
(Joins sheet 32)
(Joins sheet 43)
(Joins sheet 30)
T. 19 N.
720 000 FEET
710 000 FEET
1 960 000 FEET
Victoria Creek
Creek
Dry Creek
1
2
3
5
6
7
8
10
11
12
13
14
15
17
18
1 Mile
5000 Feet
Scale 1:20000

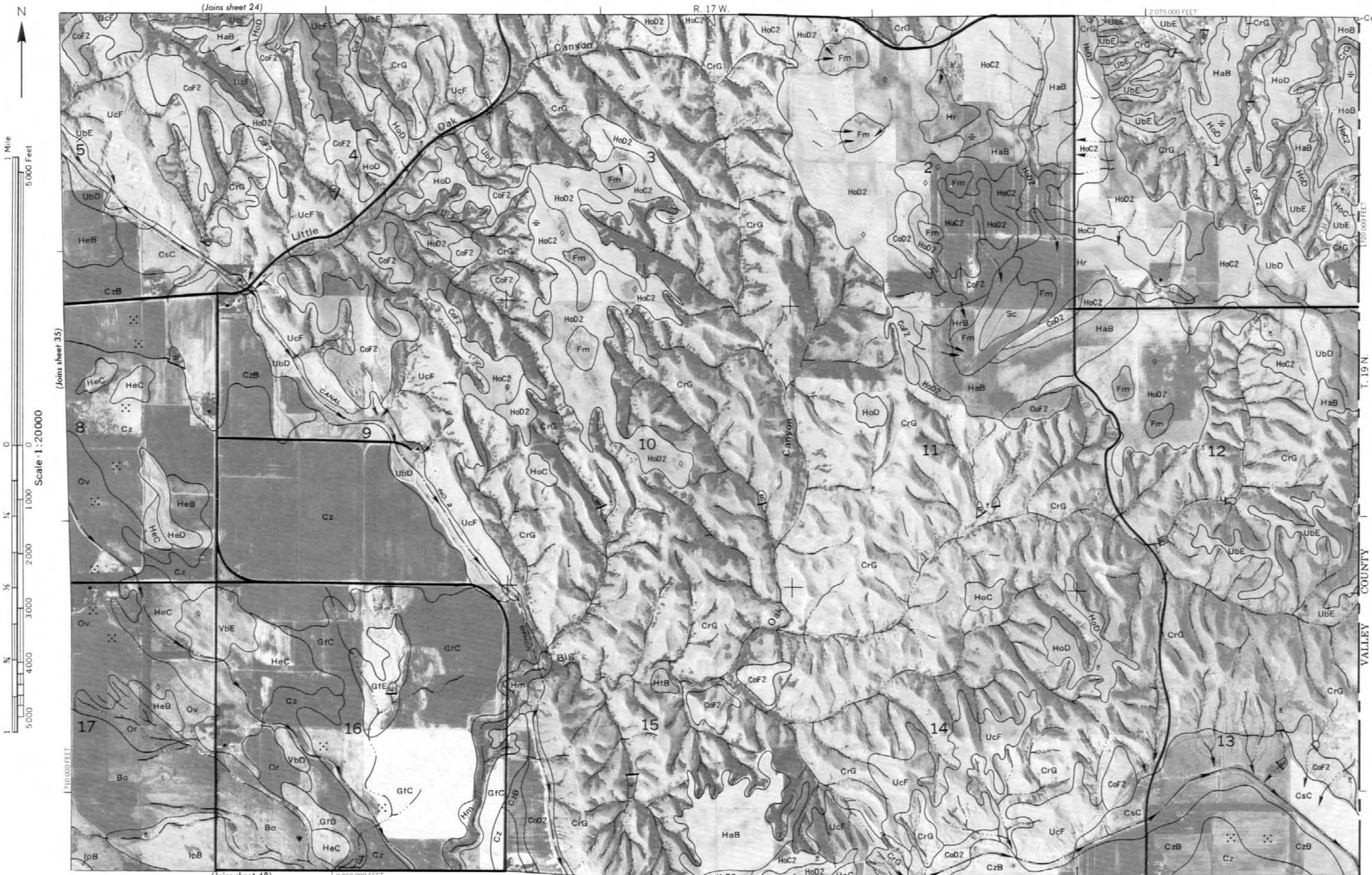

32
N
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
(Joins sheet 20)
R. 20 W.
1 980 000 FEET
(Joins sheet 31)
(Joins sheet 33)
(Joins sheet 44)
1 965 000 FEET
720 000 FEET
710 000 FEET
T. 19 N.
MIDDLE
LOUP
RIVER
Walworth
Gates
GATES CEMETERY
Lillian
Creek
1
2
3
4
5
8
9
10
11
12
13
14
15
16
17

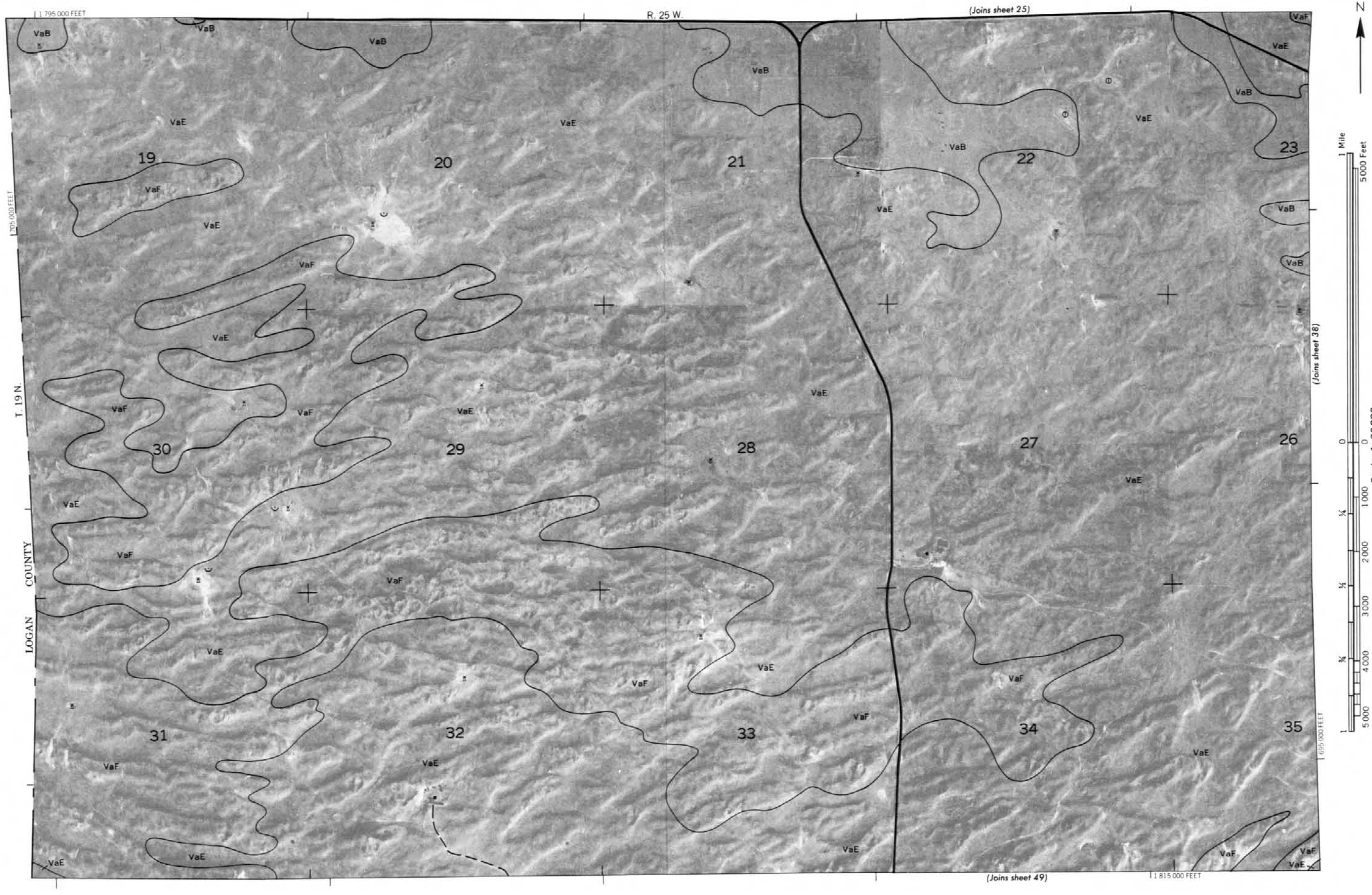

33
N
R. 19 W.
T. 19 N.
1 985 000 FEET
720 000 FEET
710 000 FEET
2 005 000 FEET
(Joins sheet 21)
(Joins sheet 32)
(Joins sheet 34)
(Joins sheet 45)
MIDDLE
LOUP
RIVER
1 Mile
5000 Feet
Scale 1:20000
¼
½
¾
0
1000
2000
3000
4000
5000

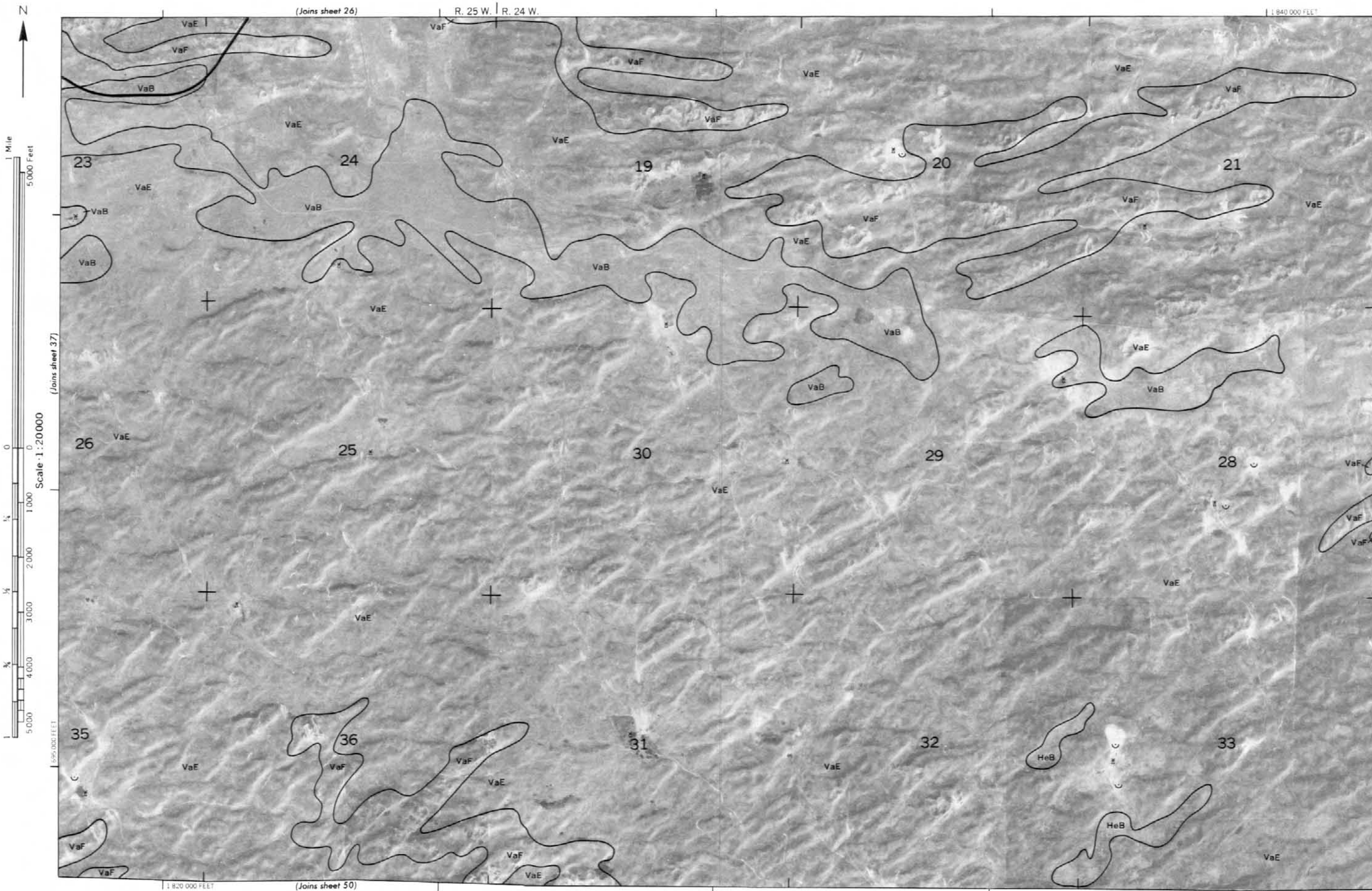
CUSTER COUNTY, NEBRASKA — SHEET NUMBER 34

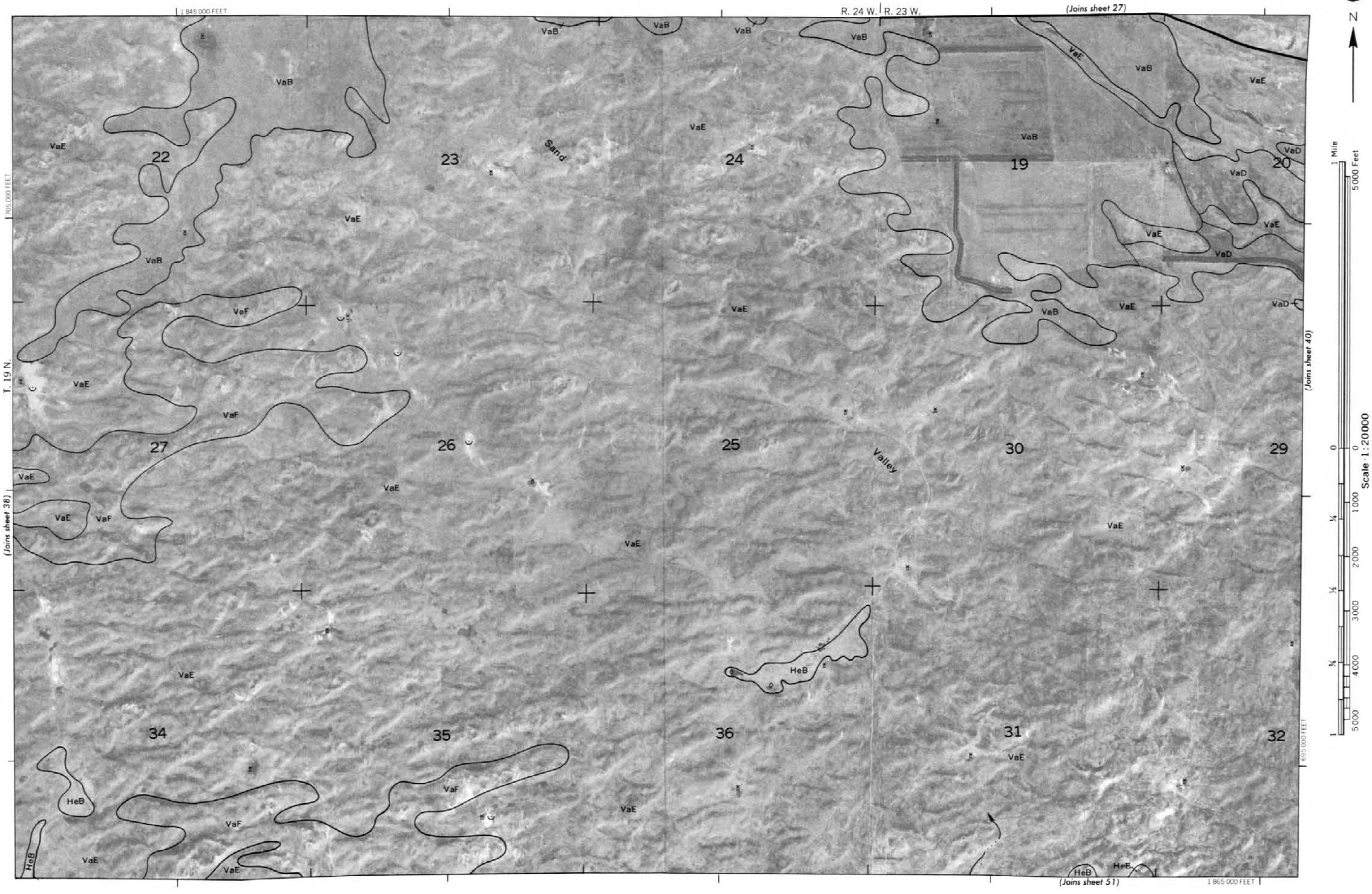



(Joins sheet 23)
(Joins sheet 36)
(Joins sheet 47)
(Joins sheet 34)
R. 18 W.
R. 17 W.
T. 19 N.
2 035 000 FEET
2 055 000 FEET
720 000 FEET
710 000 FEET
N
Sargent
Sargent Landing Field
BURLINGTON
NORTHERN
CANAL
NO. 2
SEWAGE LAGOON
MIDDLE
LOUP
RIVER
183
1 Mile
5000 Feet
Scale 1:20000
1
2
3
5
6
7
8
10
11
12
13
14
15
17
18
Cz
CsC
HeB
HeC
HeD
HeE
IpB
VbB
VbD
VbE
VaD
VaE
VaF
Ba
Bo
Bn
Bp
Gb
Ov
Ru
Ca
CzB
UbE
UcF
UbD
GfF
GfC
GfD
HrB
HhF
HoD
HoC2
CrG
Hm
An

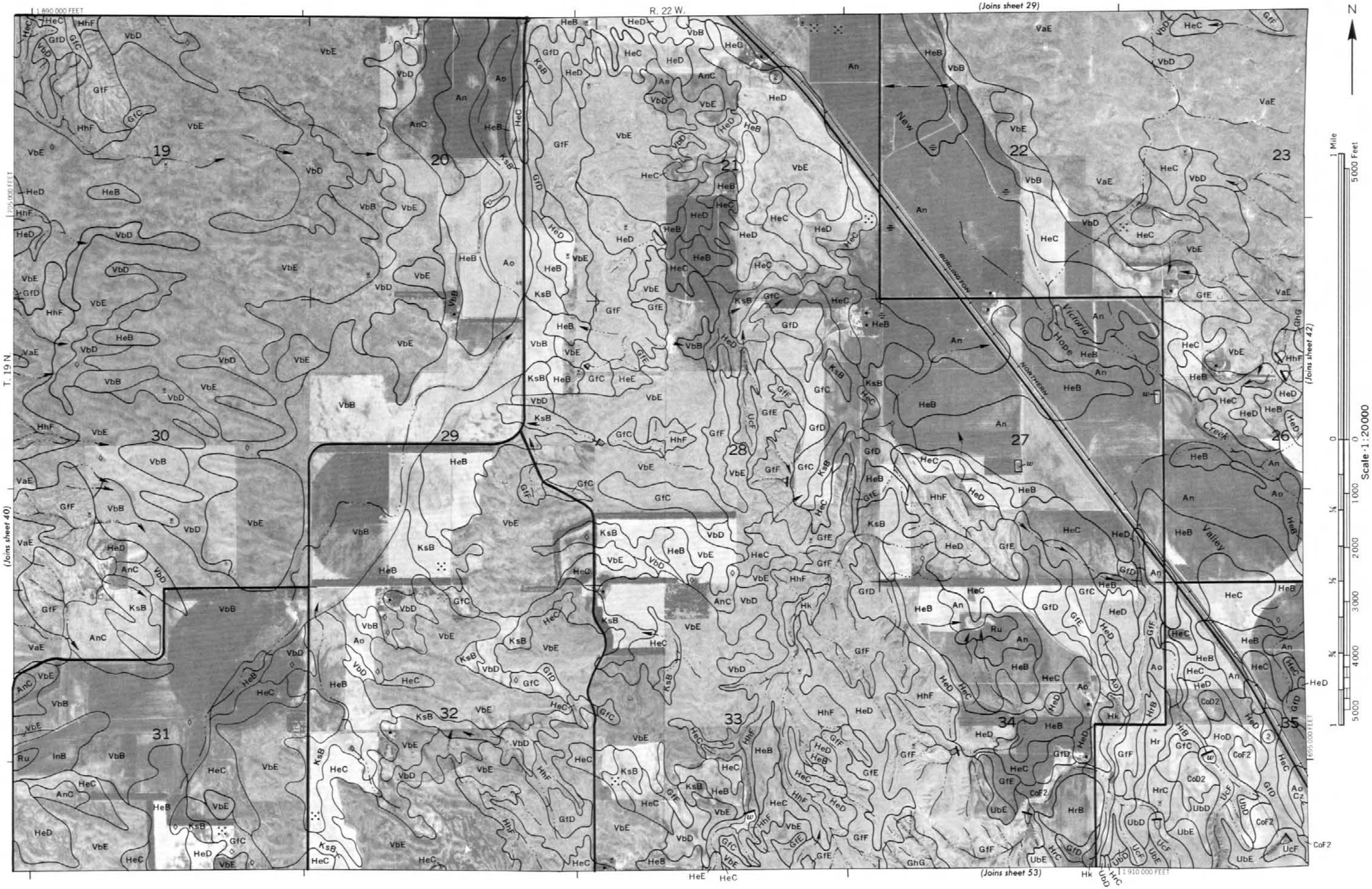

N
(Joins sheet 24)
(Joins sheet 35)
(Joins sheet 48)
R. 17 W.
T. 19 N.
VALLEY COUNTY
2 075 000 FEET
720 000 FEET
710 000 FEET
2 060 000 FEET
Little
Oak
Canyon
Big
CANAL
NO. 2
Scale 1:20000
1 Mile
5000 Feet
1
2
3
4
5
8
9
10
11
12
13
14
15
16
17


1 795 000 FEET
R. 25 W.
(Joins sheet 25)
N
705 000 FEET
T. 19 N.
LOGAN COUNTY
(Joins sheet 38)
695 000 FEET
(Joins sheet 49)
1 815 000 FEET
19
20
21
22
23
26
27
28
29
30
31
32
33
34
35
VaB
VaE
VaF
1 Mile
5000 Feet
0
1000
2000
3000
4000
5000
¼
½
¾
1
Scale 1:20000

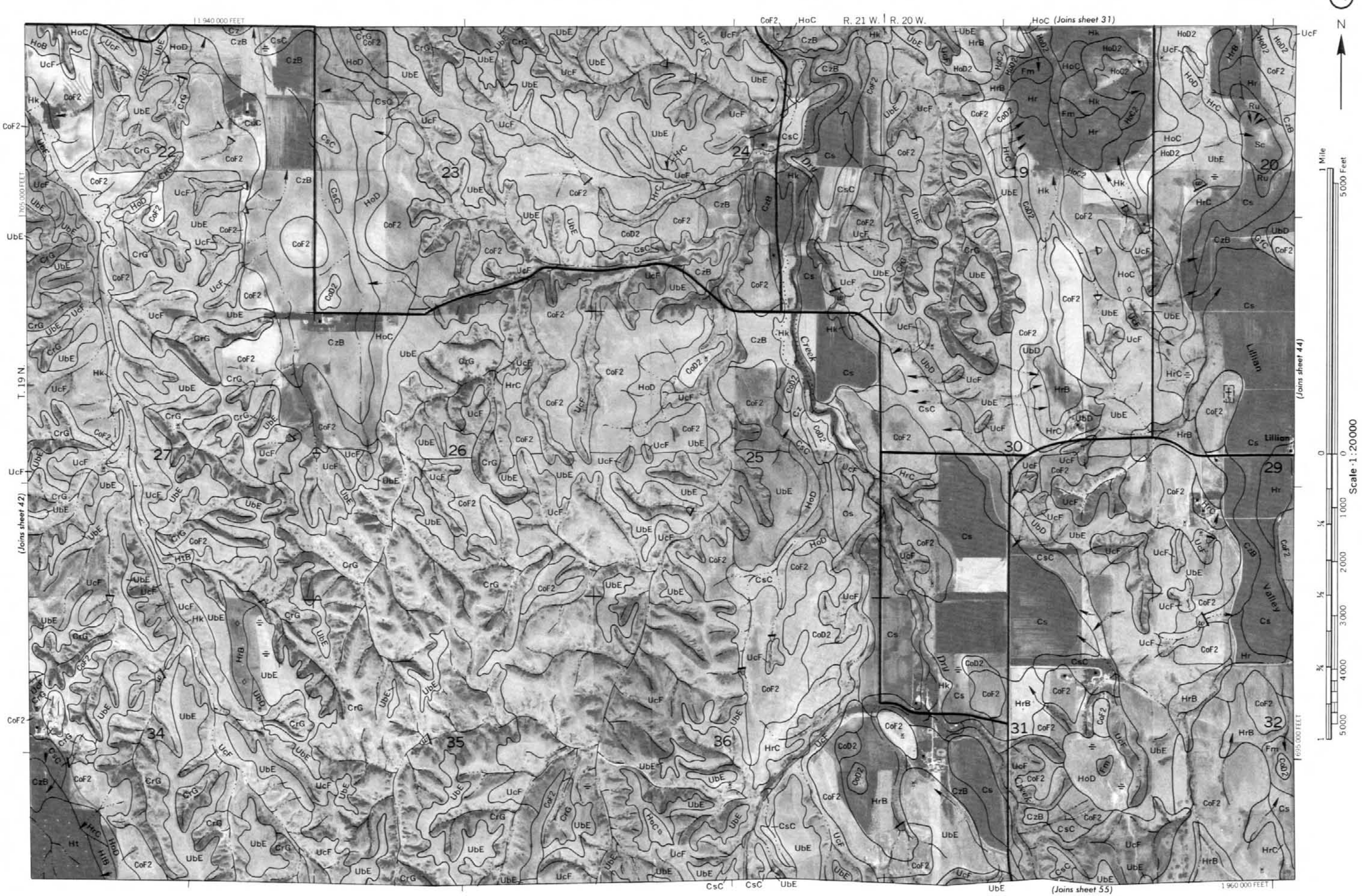

38
N
(Joins sheet 26)
R. 25 W.
R. 24 W.
1 840 000 FEET
(Joins sheet 37)
(Joins sheet 39)
(Joins sheet 50)
1 820 000 FEET
705 000 FEET
695 000 FEET
T. 19 N.
Scale 1:20000
1 Mile
5000 Feet
0
1000
2000
3000
4000
5000
¼
½
¾
1
23
24
19
20
21
26
25
30
29
28
35
36
31
32
33
VaE
VaF
VaB
HeB

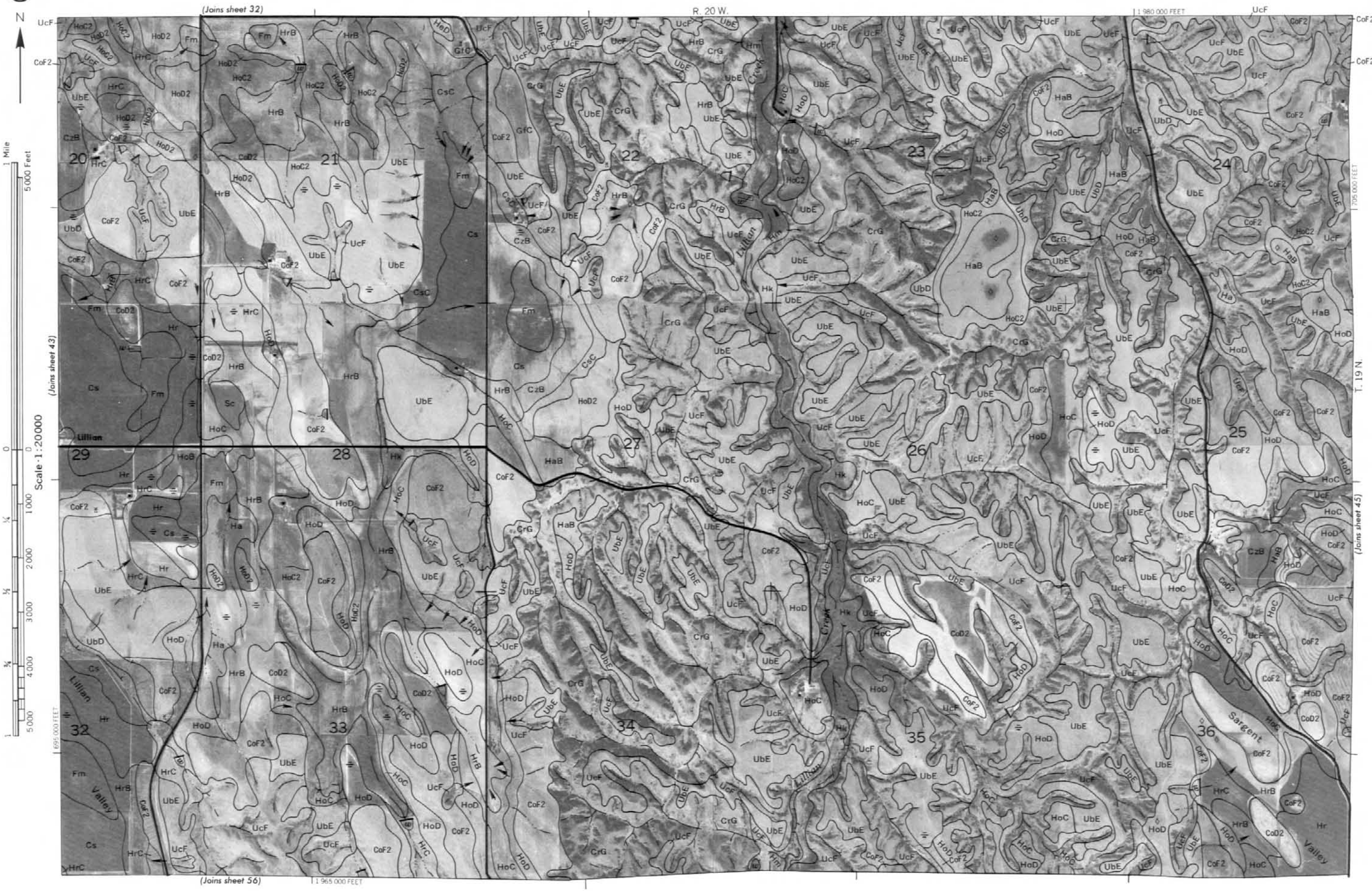

39
N
1 845 000 FEET
R. 24 W. | R. 23 W.
(Joins sheet 27)
705 000 FEET
T. 19 N.
(Joins sheet 38)
(Joins sheet 40)
(Joins sheet 51)
695 000 FEET
1 865 000 FEET
22
23
24
19
20
27
26
25
30
29
34
35
36
31
32
Sand
Valley
VaB
VaE
VaF
VaD
HeB
1 Mile
5000 Feet
0
1000
2000
3000
4000
5000
¼
½
¾
1
Scale 1:20000

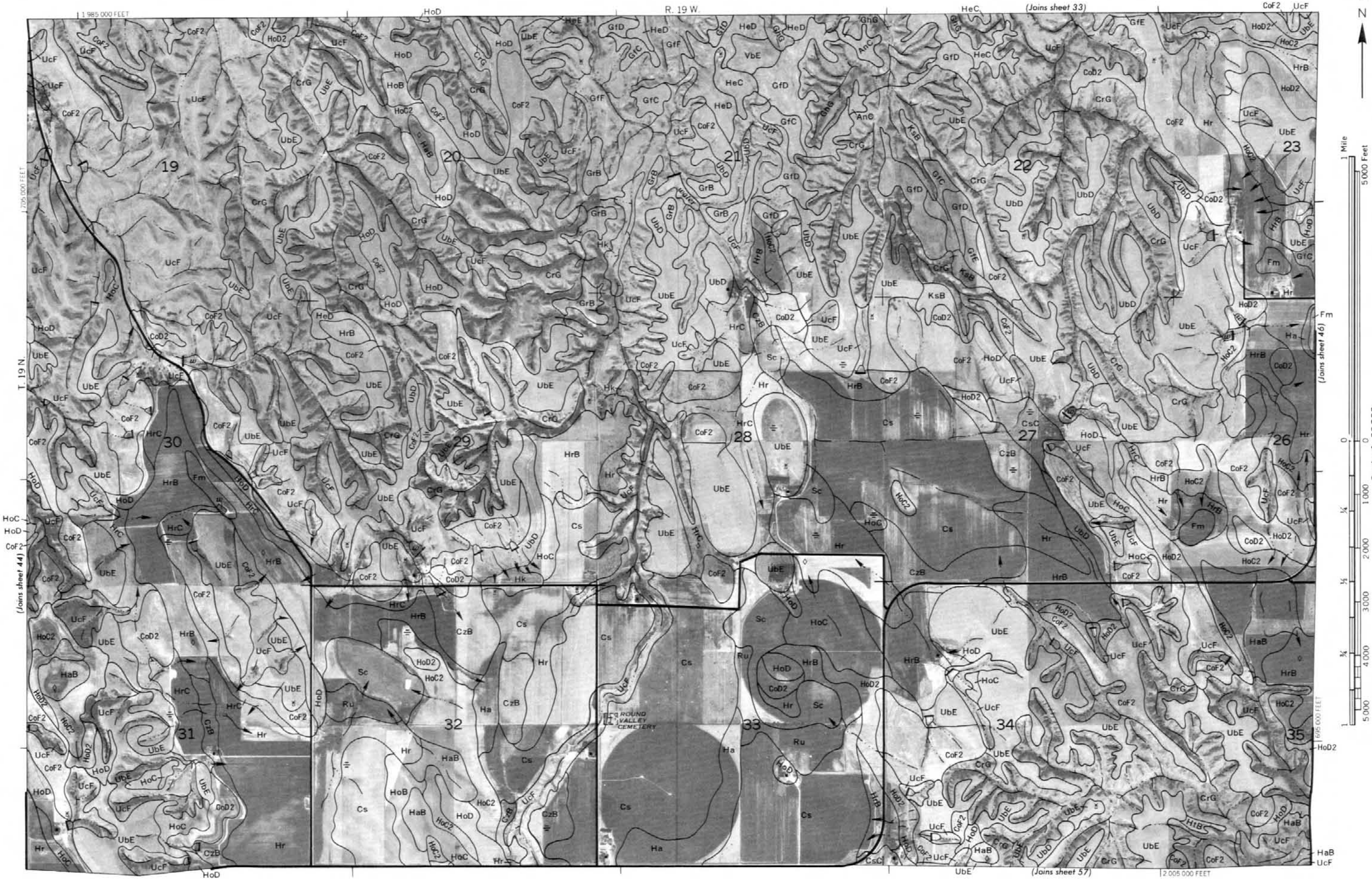

N
1 Mile
5000 Feet
0
Scale 1:20000
1000
2000
3000
4000
5000
(Joins sheet 28)
R. 23 W.
1 885 000 FEET
HeC
705 000 FEET
T. 19 N.
(Joins sheet 41)
(Joins sheet 39)
695 000 FEET
1 870 000 FEET
(Joins sheet 52)
20
21
22
23
24
29
28
27
26
25
32
33
34
35
36
VaE
VaB
VaD
VaF
VbE
VbB
VbD
HeB
HeC
HeD
HhF
GfD
GfC
GfF
GhG
Ao
Ks
KsB
AnC
InB
Ru

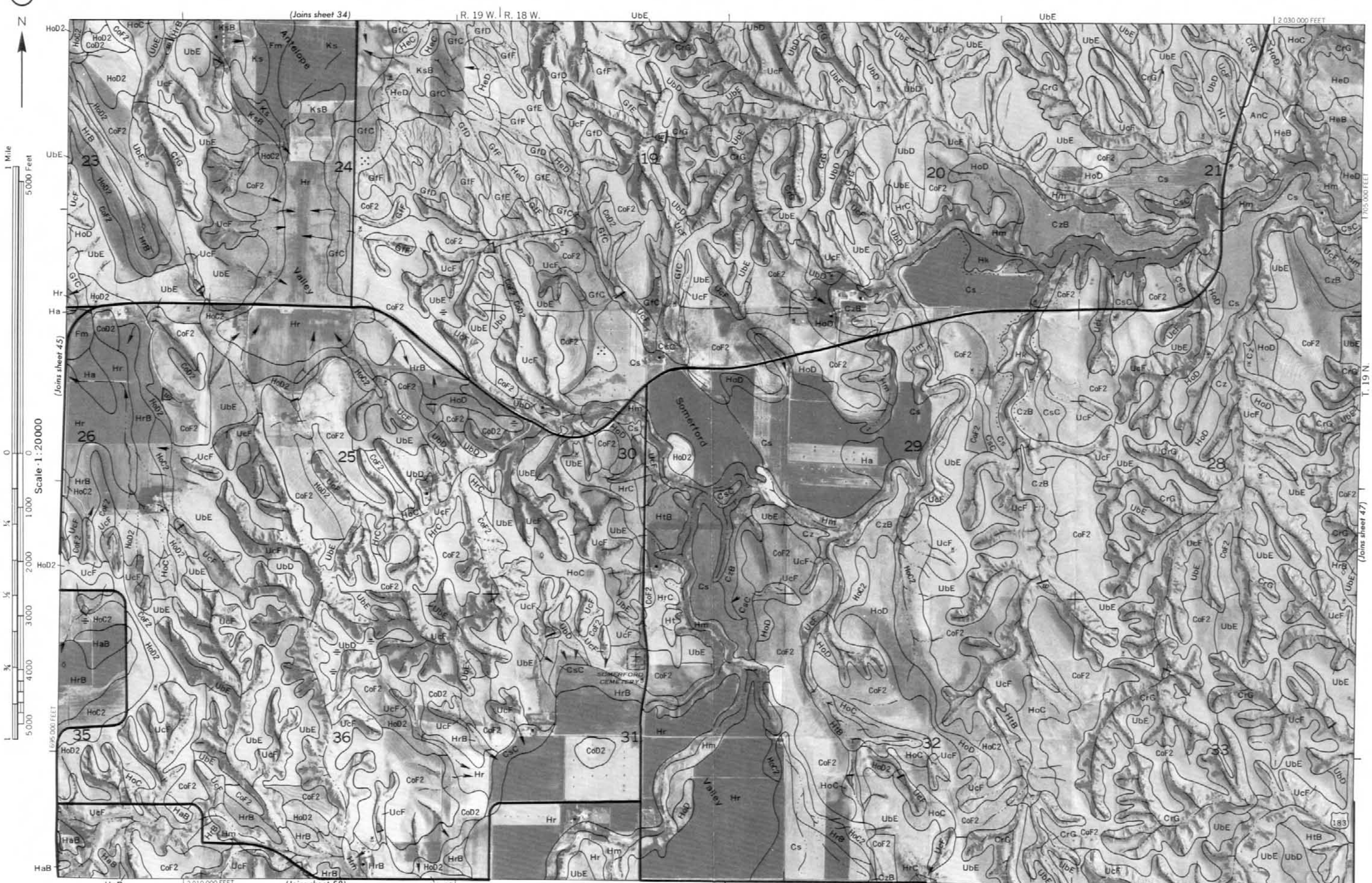

N
R. 22 W.
T. 19 N.
(Joins sheet 29)
(Joins sheet 40)
(Joins sheet 42)
(Joins sheet 53)
1 890 000 FEET
1 910 000 FEET
19
20
21
22
23
26
27
28
29
30
31
32
33
34
35
New
Victoria
Hope
Creek
Valley
BURLINGTON
NORTHERN
1 Mile
5000 Feet
Scale 1:20000

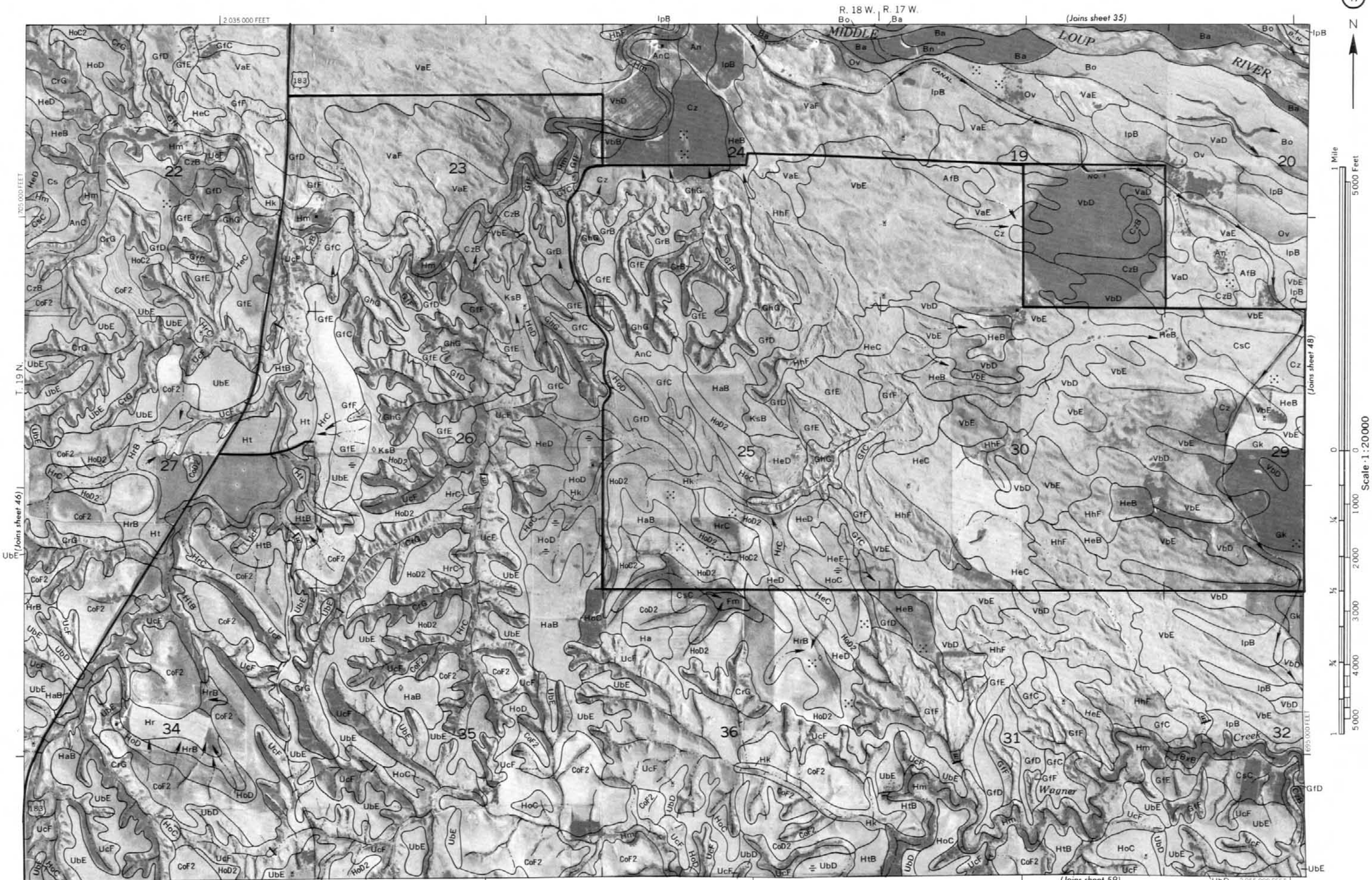

N
(Joins sheet 30)
R. 22 W. | R. 21 W.
1 935 000 FEET
705 000 FEET
VICTORIA SPRINGS STATE PARK
New Helena
Water
Victoria Creek
NEW HOPE CEMETERY
Pleasant Valley
(Joins sheet 41)
(Joins sheet 43)
(Joins sheet 54)
T. 19 N.
695 000 FEET
1 915 000 FEET
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
19
20
21
23
24
25
26
28
29
30
31
32
33
35
36

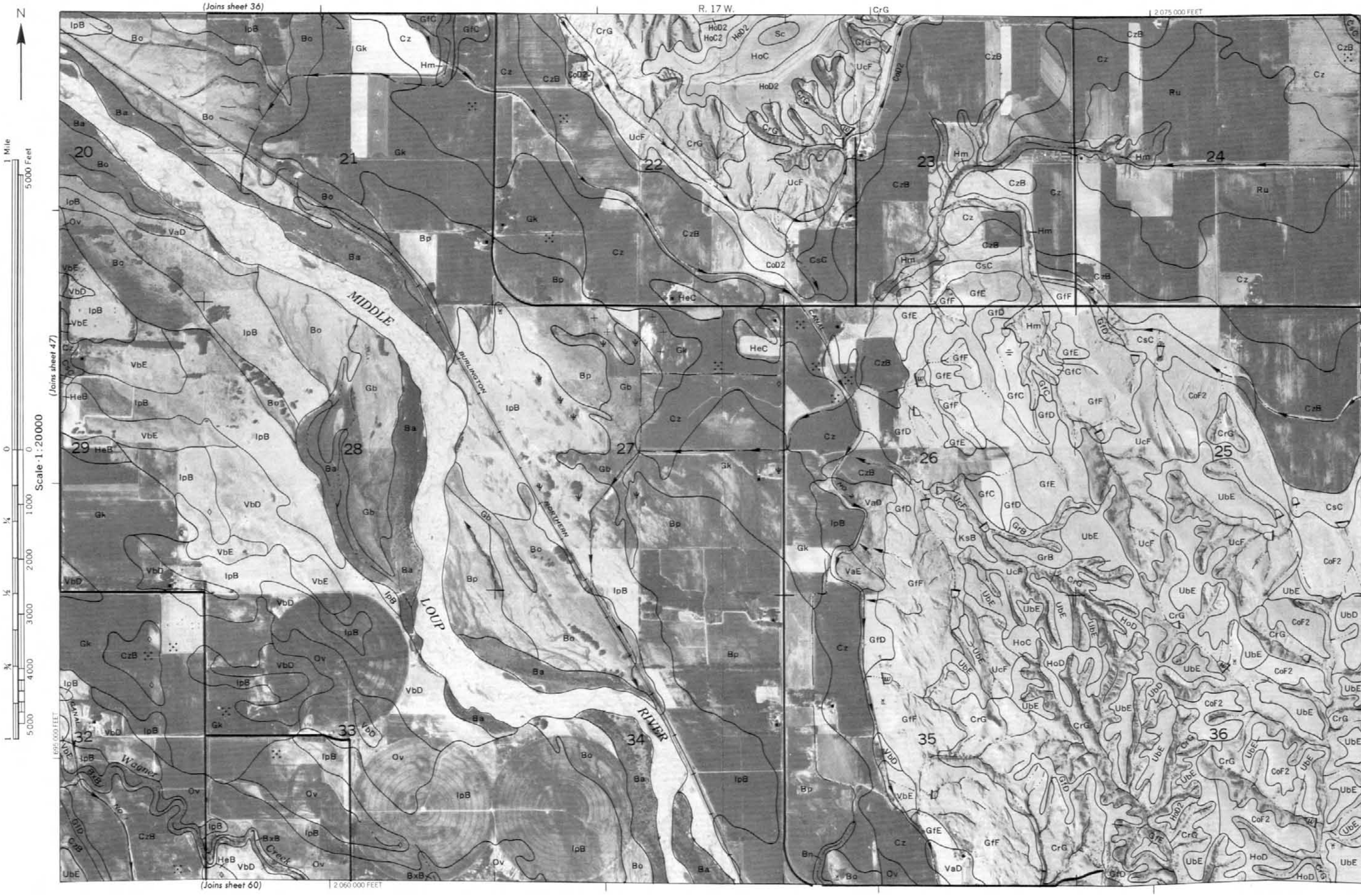

43
N
(Joins sheet 31)
R. 21 W.
R. 20 W.
T. 19 N.
(Joins sheet 42)
(Joins sheet 44)
(Joins sheet 55)
1 940 000 FEET
1 960 000 FEET
705 000 FEET
695 000 FEET
Dry Creek
Lillian Valley
Lillian
1 Mile
5000 Feet
Scale 1:20000

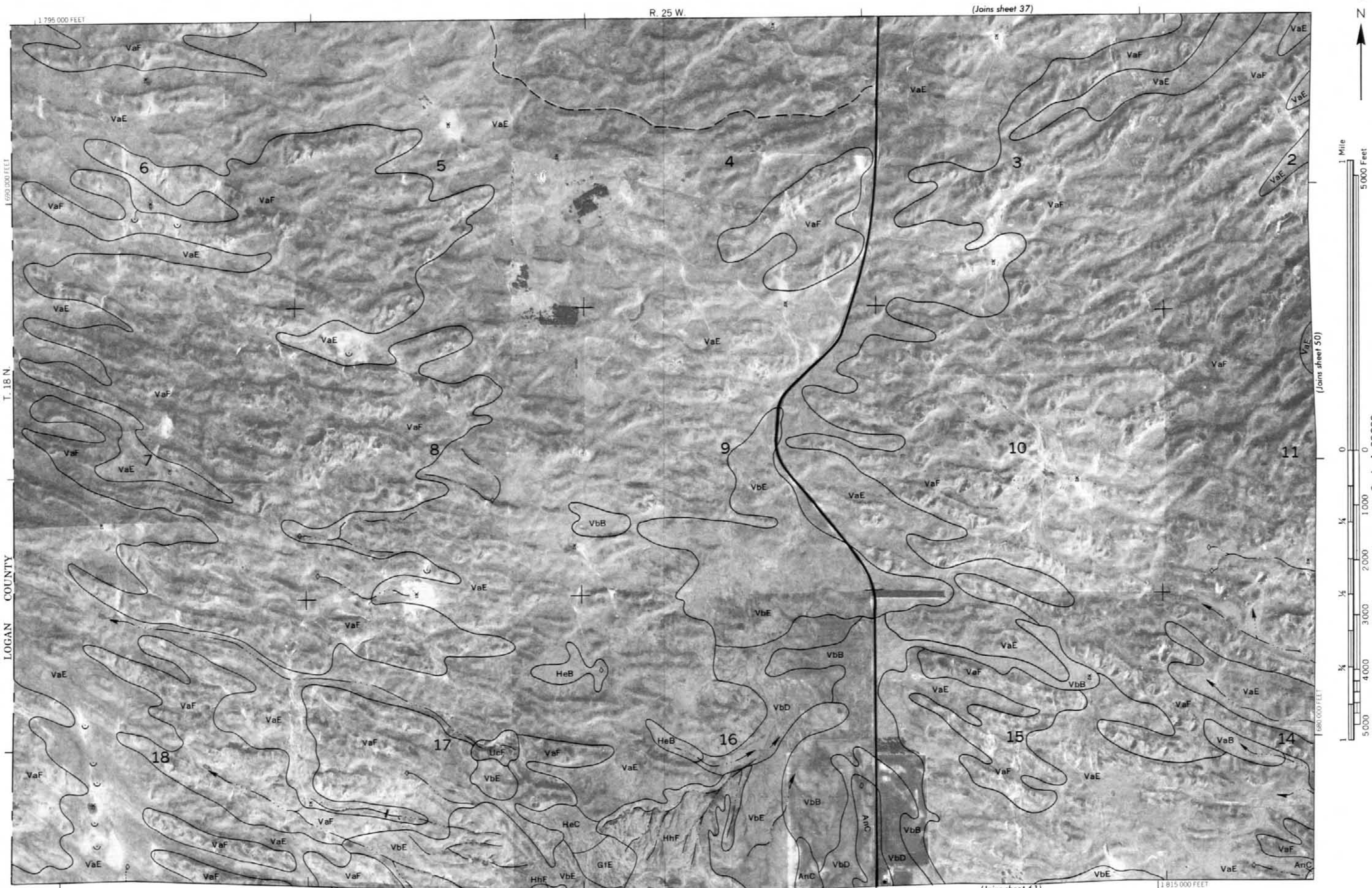

N
(Joins sheet 32)
R. 20 W.
1 980 000 FEET
(Joins sheet 43)
(Joins sheet 45)
T. 19 N.
705 000 FEET
695 000 FEET
(Joins sheet 56)
1 965 000 FEET
Scale 1:20000
1 Mile
5 000 Feet
Lillian
Lillian Creek
Sargent Valley
Lillian Valley
20
21
22
23
24
25
26
27
28
29
32
33
34
35
36


45
N
(Joins sheet 33)
R. 19 W.
T. 19 N.
1 985 000 FEET
2 005 000 FEET
(Joins sheet 44)
(Joins sheet 46)
(Joins sheet 57)
ROUND VALLEY CEMETERY
19
20
21
22
23
26
27
28
29
30
31
32
33
34
35
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
¼
½
¾
1


N
(Joins sheet 34)
R. 19 W.
R. 18 W.
T. 19 N.
(Joins sheet 45)
(Joins sheet 47)
(Joins sheet 58)
2 030 000 FEET
705 000 FEET
695 000 FEET
2 010 000 FEET
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
Antelope
Valley
Somerford
SOMERFORD CEMETERY
Valley
19
20
21
23
24
25
26
28
29
30
31
32
33
35
36
183

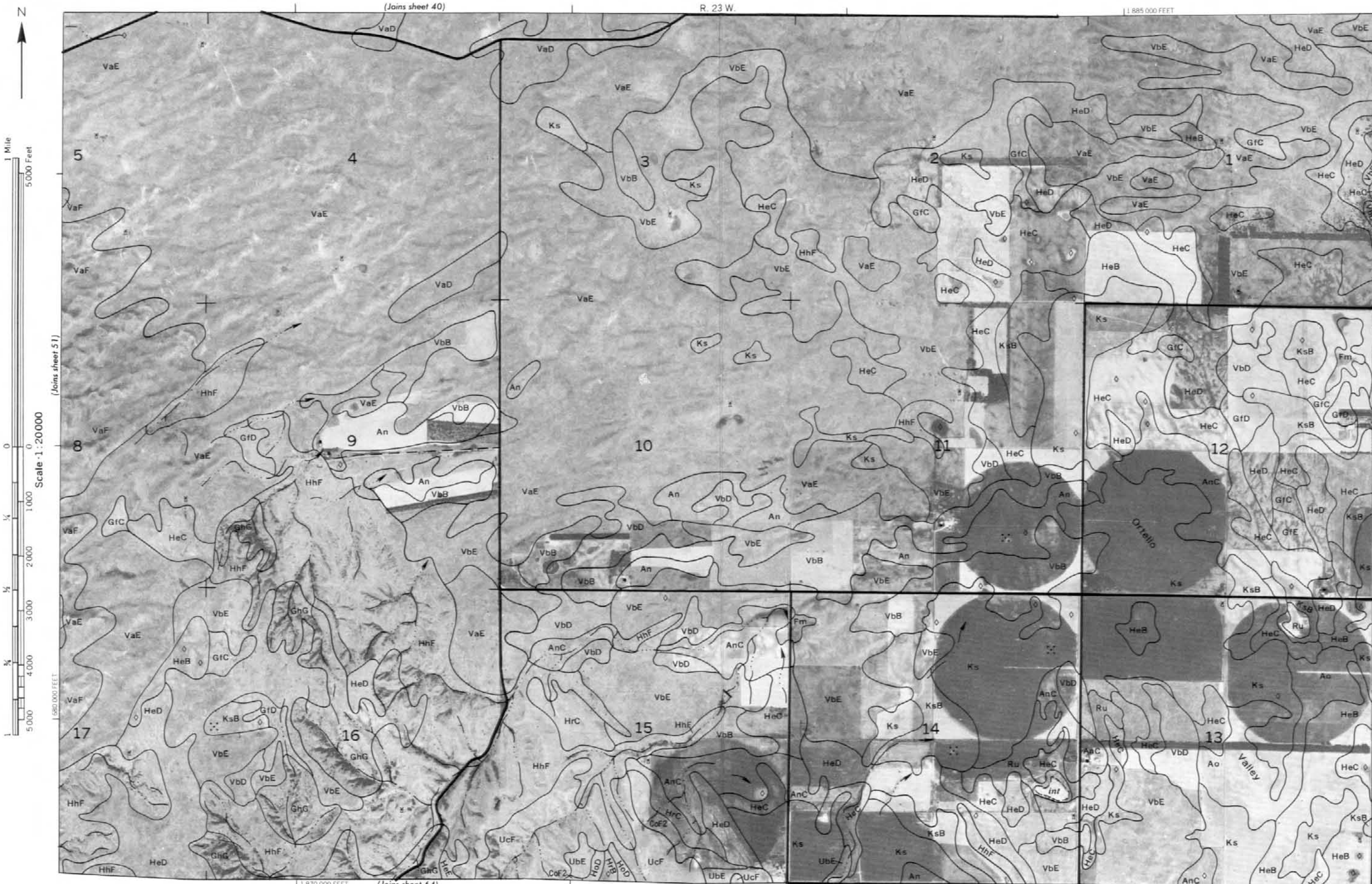

R. 18 W.
R. 17 W.
(Joins sheet 35)
(Joins sheet 46)
(Joins sheet 48)
(Joins sheet 59)
2 035 000 FEET
2 055 000 FEET
705 000 FEET
695 000 FEET
T. 19 N.
N
MIDDLE
LOUP
RIVER
CANAL
NO. 1
Creek
Wagner
183
19
20
22
23
24
25
26
27
29
30
31
32
34
35
36
1 Mile
5000 Feet
Scale 1:20000

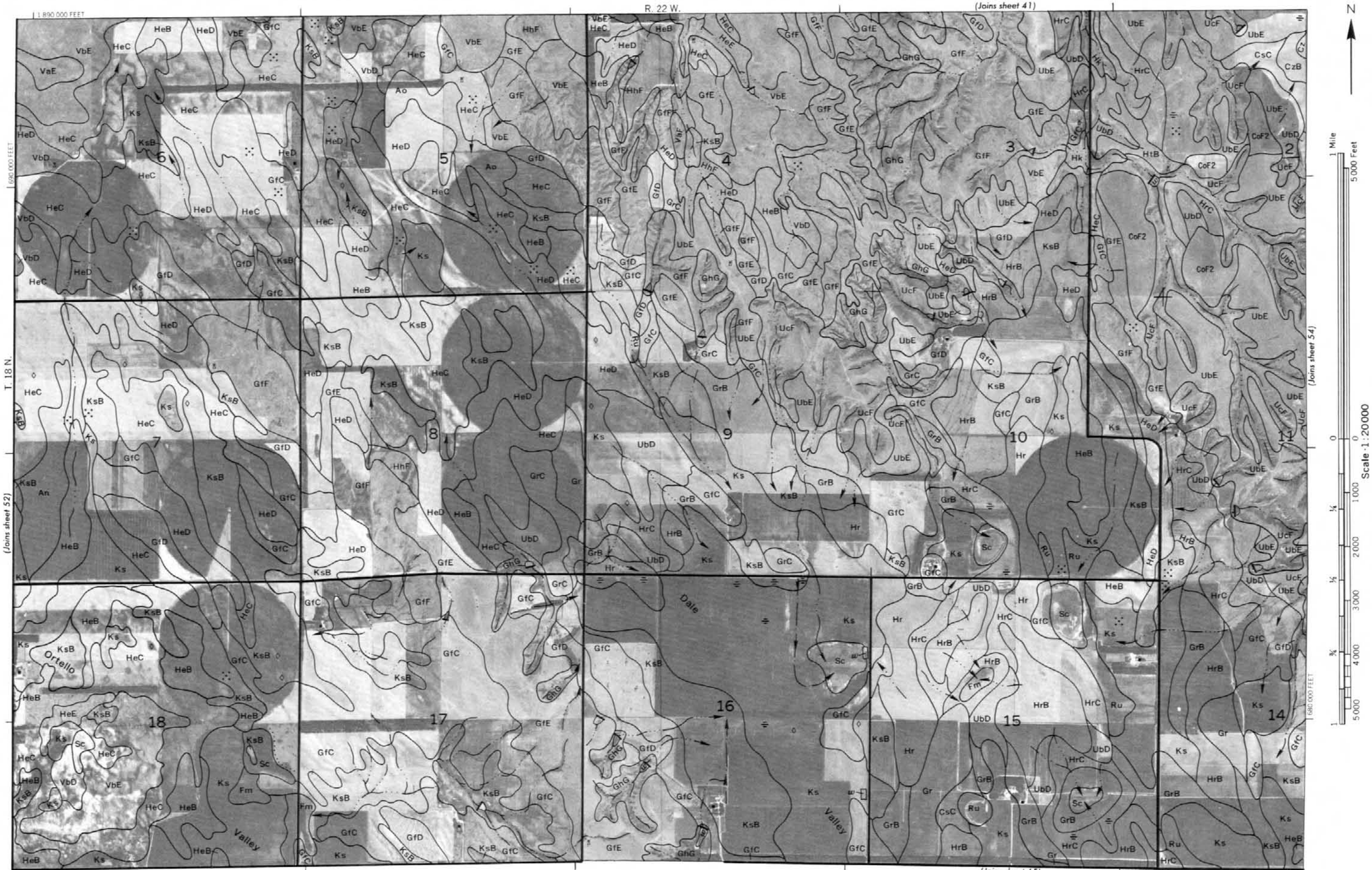

48
N
(Joins sheet 36)
(Joins sheet 47)
(Joins sheet 60)
R. 17 W.
T. 19 N.
2 075 000 FEET
2 060 000 FEET
705 000 FEET
695 000 FEET
MIDDLE
LOUP
RIVER
BURLINGTON
NORTHERN
CANAL
Wagner
Creek
VALLEY COUNTY
20
21
22
23
24
25
26
27
28
29
32
33
34
35
36
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
¼
½
¾
1


49
N
R. 25 W.
(Joins sheet 37)
(Joins sheet 50)
(Joins sheet 61)
T. 18 N.
LOGAN COUNTY
1 795 000 FEET
690 000 FEET
680 000 FEET
1 815 000 FEET
1 Mile
5000 Feet
Scale 1:20000
VaE
VaF
VbE
VbB
VbD
HeB
HeC
HhF
GfE
UcF
AnC
VaB

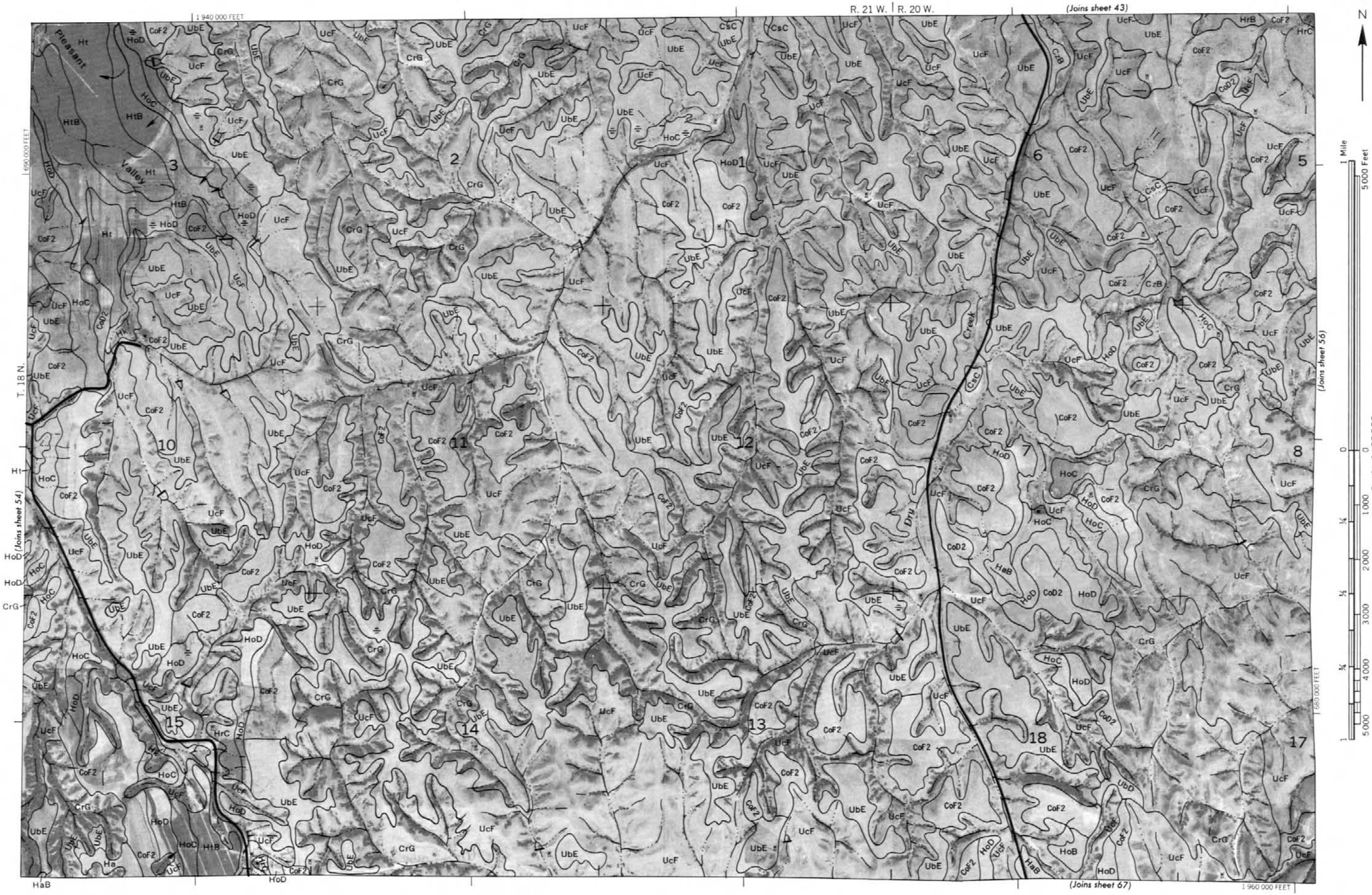

50
N
(Joins sheet 38)
R. 25 W.
R. 24 W.
1 840 000 FEET
650 000 FEET
T. 18 N.
(Joins sheet 51)
(Joins sheet 49)
680 000 FEET
1 820 000 FEET
(Joins sheet 62)
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
¼
½
¾
1
1
2
4
5
6
7
8
9
11
12
13
14
16
17
18
VaE
VaF
VaB
VaD
VbE
VbB
VbD
HeB
HeC
HeD
HhF
GfC
GfE
GhG
AnC
An
Ao
UcF
HcG2
CrG


51
N
(Joins sheet 39)
(Joins sheet 52)
(Joins sheet 63)
(Joins sheet 50)
R. 24 W.
R. 23 W.
T. 18 N.
1 845 000 FEET
1 865 000 FEET
690 000 FEET
680 000 FEET
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
¼
½
¾
1
2
3
5
6
7
8
10
11
12
13
14
15
17
18
Dry
Creek
VaE
VaF
VaB
HeB
HeC
HeD
HeE
VbB
VbD
VbE
Ks
KsB
AnC
An
Ao
HhF
GfE
GfC
UcF
UbE
CrG
CoF2
HoC2
HtB
Ht
Ca
int

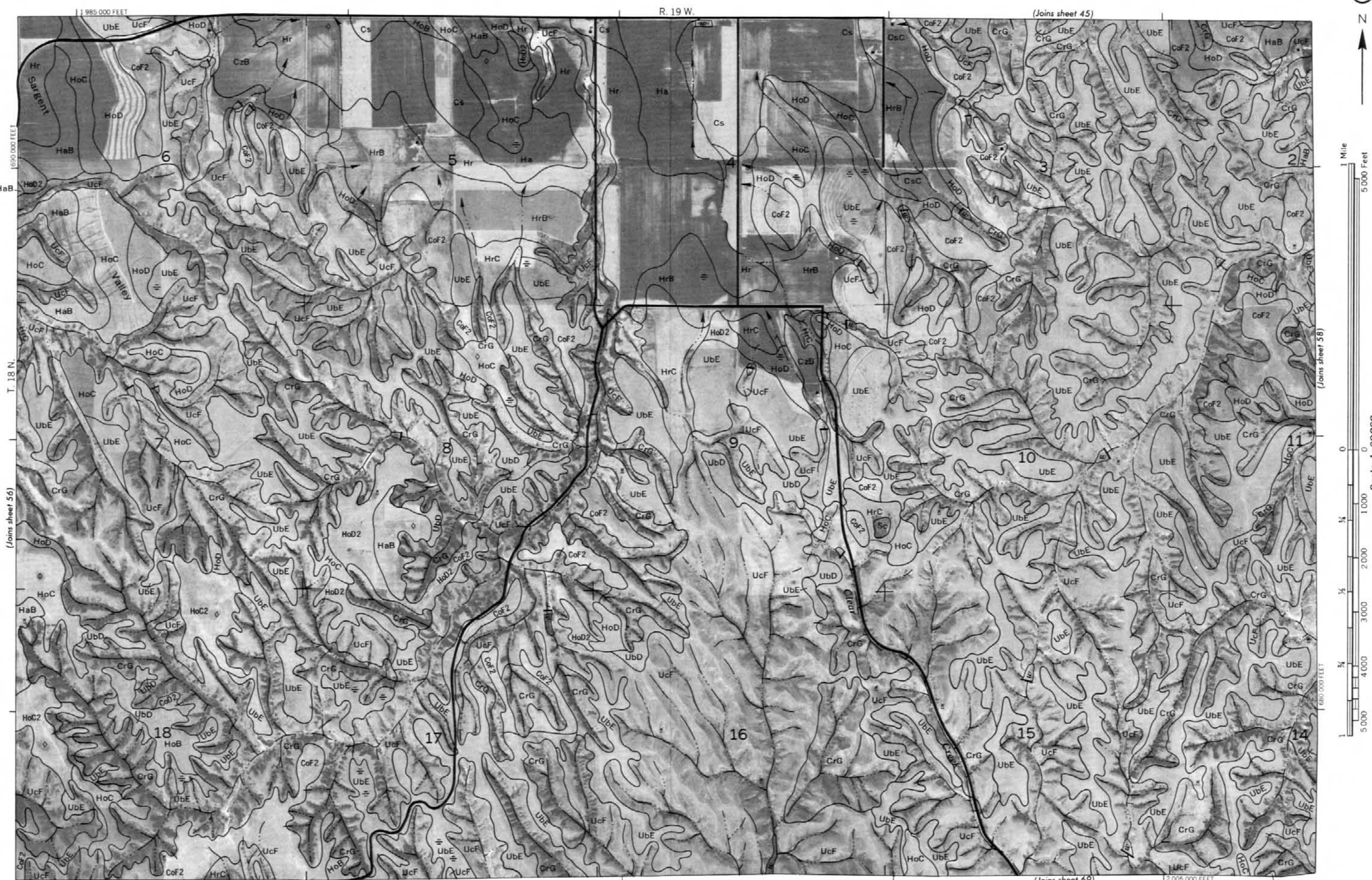

N
(Joins sheet 40)
R. 23 W.
1 885 000 FEET
690 000 FEET
T. 18 N.
(Joins sheet 51)
(Joins sheet 53)
(Joins sheet 64)
1 870 000 FEET
680 000 FEET
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
¼
½
¾
1
Ortello
Valley
1
2
3
4
5
8
9
10
11
12
13
14
15
16
17

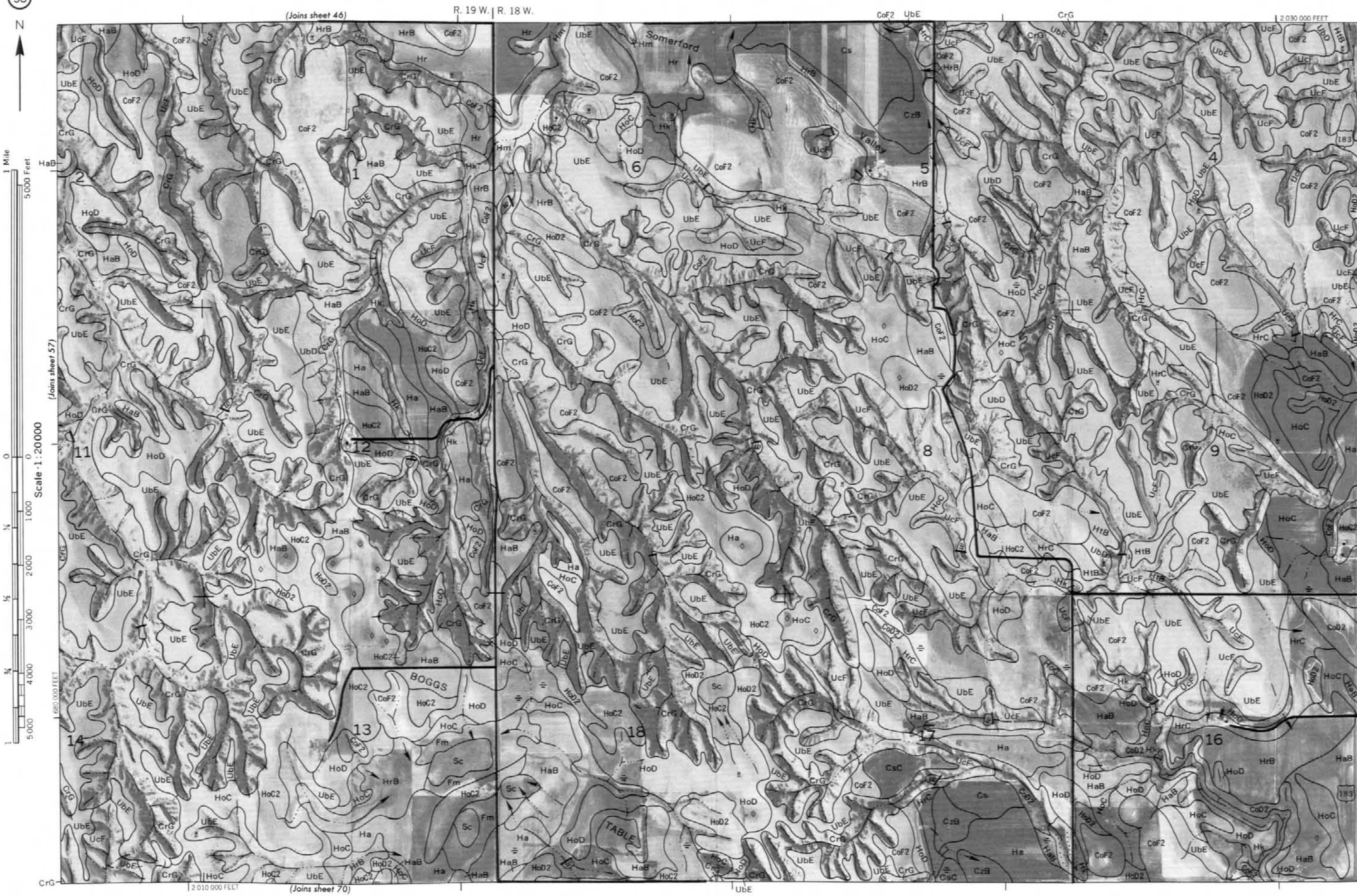

(Joins sheet 41)
R. 22 W.
T. 18 N.
(Joins sheet 52)
(Joins sheet 54)
(Joins sheet 65)
Dale
Valley
Ortello
Valley
N
1 Mile
5000 Feet
Scale 1:20000
1 890 000 FEET
1 910 000 FEET
690 000 FEET
680 000 FEET

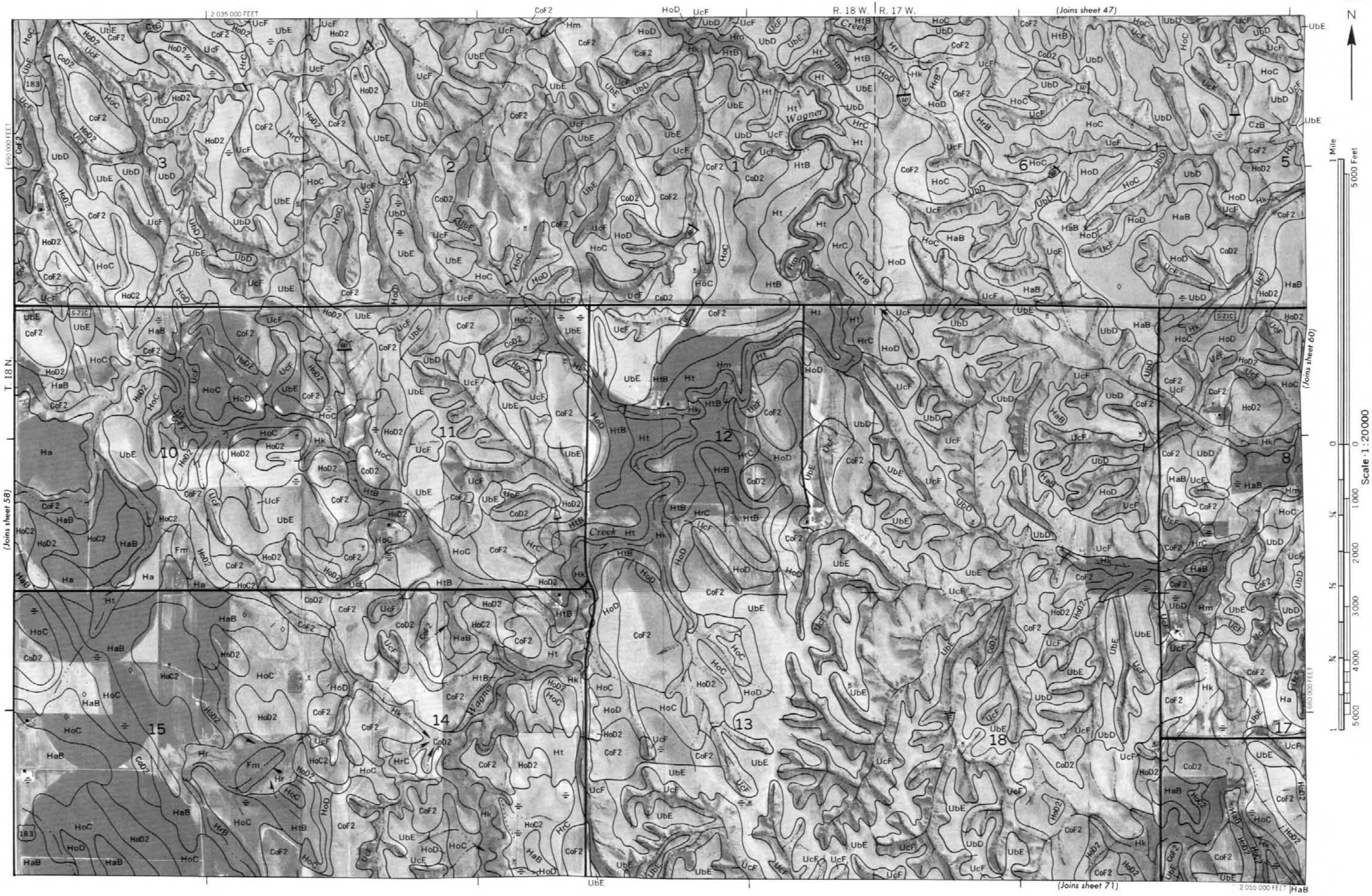

N
(Joins sheet 42)
R. 22 W.
R. 21 W.
1 935 000 FEET
690 000 FEET
T. 18 N.
(Joins sheet 55)
(Joins sheet 53)
(Joins sheet 66)
1 915 000 FEET
680 000 FEET
1 Mile
5000 Feet
Scale 1:20000
BURLINGTON
NORTHERN
1
2
4
5
6
7
8
9
11
12
13
14
16
17
18

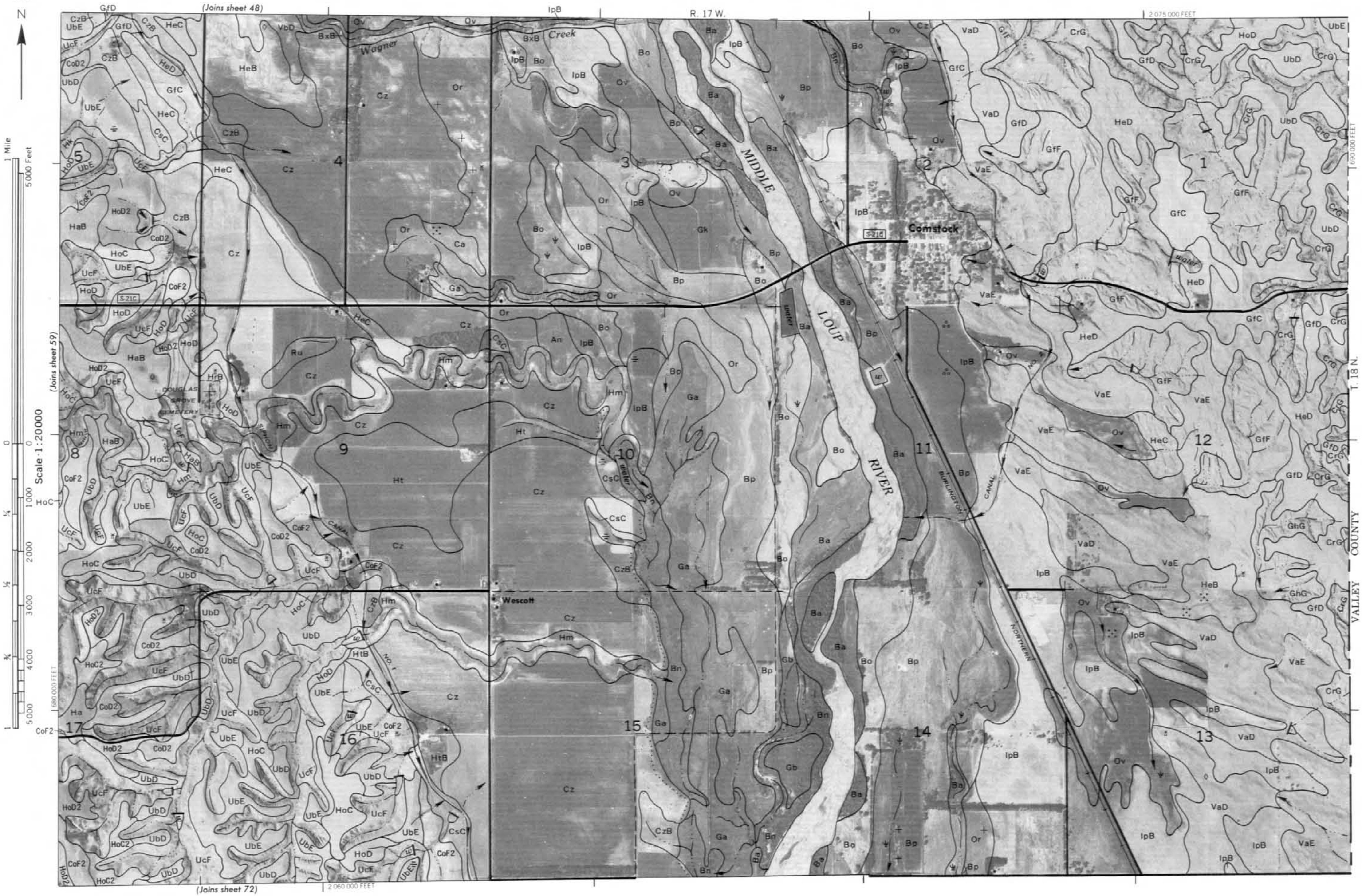

1 940 000 FEET
R. 21 W. | R. 20 W.
(Joins sheet 43)
(Joins sheet 56)
(Joins sheet 54)
(Joins sheet 67)
1 960 000 FEET
690 000 FEET
680 000 FEET
T. 18 N.
Pleasant
Valley
Dry
Creek
N
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000

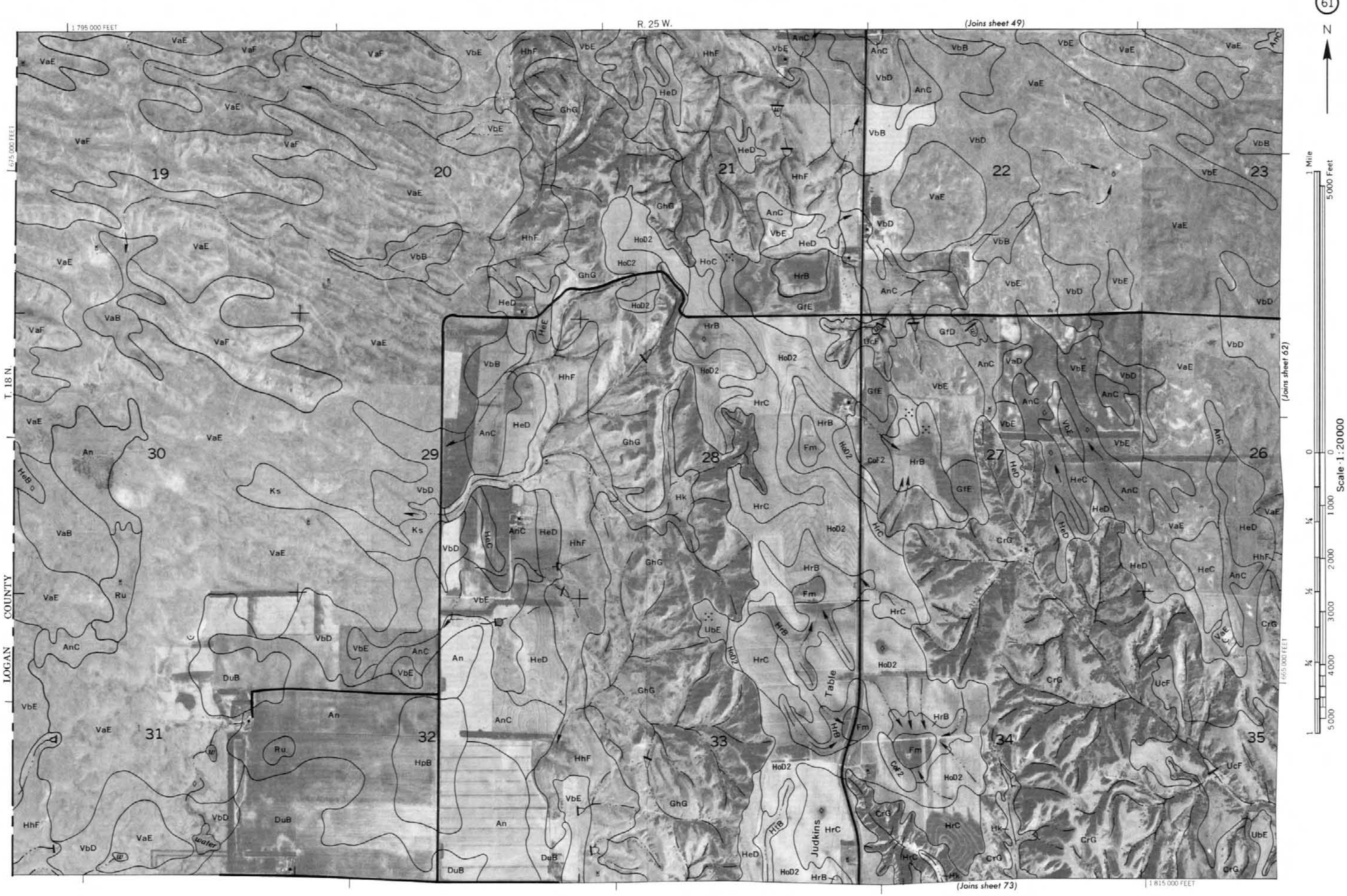

N
(Joins sheet 44)
R. 20 W.
1 980 000 FEET
690 000 FEET
T. 18 N.
(Joins sheet 57)
(Joins sheet 55)
(Joins sheet 68)
1 965 000 FEET
680 000 FEET
Scale 1:20000
1 Mile
5000 Feet
Lillian Creek
Sargent Valley
Lillian Valley

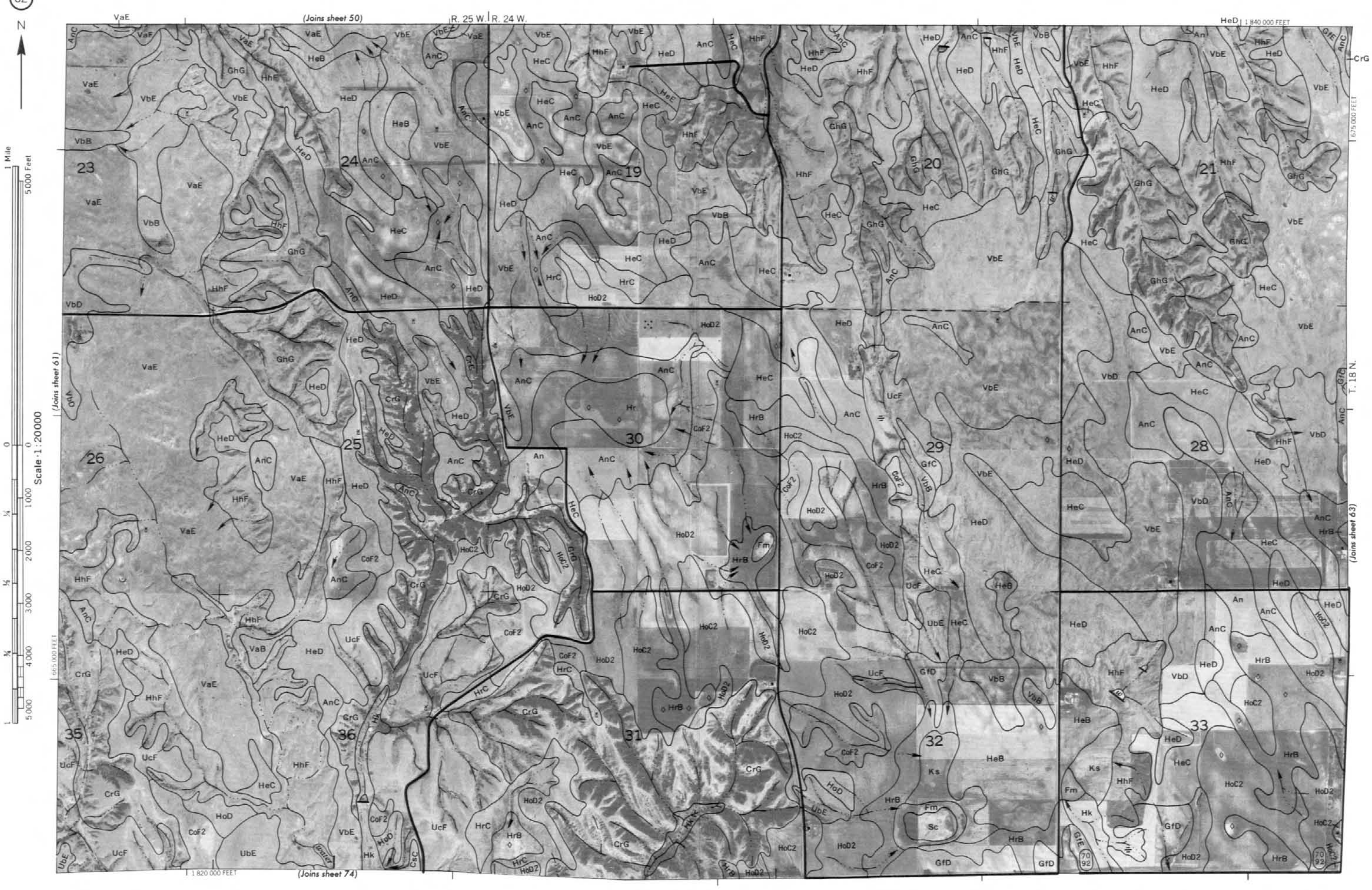

57
N
1 985 000 FEET
R. 19 W.
(Joins sheet 45)
690 000 FEET
T. 18 N.
(Joins sheet 56)
(Joins sheet 58)
(Joins sheet 69)
680 000 FEET
2 005 000 FEET
Sargent
Valley
Clear
Creek
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
0
¼
½
¾
1


N
(Joins sheet 46)
R. 19 W.
R. 18 W.
Somerford
Valley
BOGGS
TABLE
T. 18 N.
(Joins sheet 57)
(Joins sheet 59)
(Joins sheet 70)
Scale 1:20000
1 Mile
5000 Feet
2 010 000 FEET
2 030 000 FEET
690 000 FEET
680 000 FEET

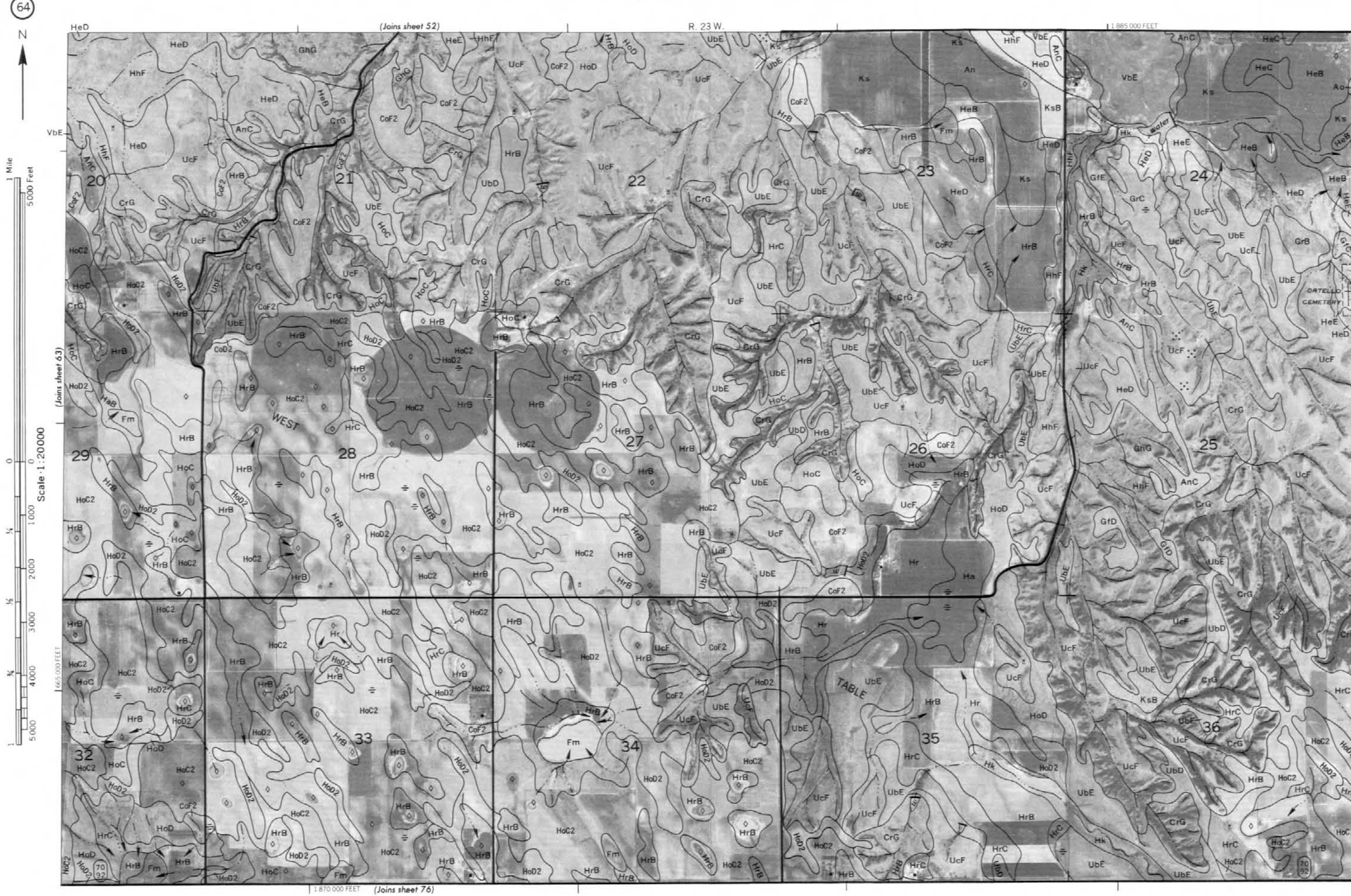

2 035 000 FEET
R. 18 W.
R. 17 W.
(Joins sheet 47)
(Joins sheet 60)
(Joins sheet 58)
(Joins sheet 71)
690 000 FEET
680 000 FEET
2 055 000 FEET
T. 18 N.
Wagner
Creek
N
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
1
2
3
5
6
7
8
10
11
12
13
14
15
17
18
183
S-21C

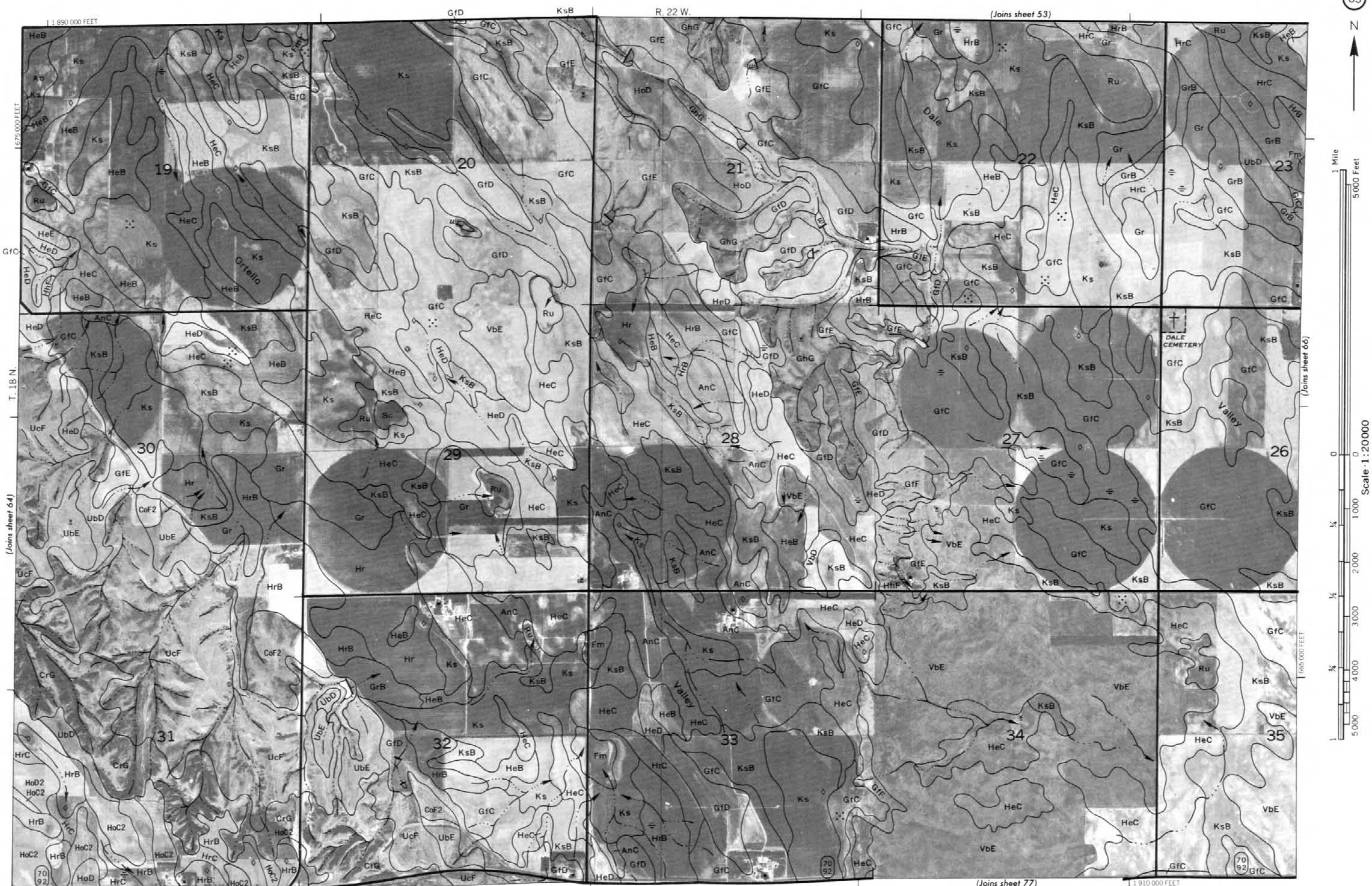

N
(Joins sheet 48)
(Joins sheet 59)
(Joins sheet 72)
R. 17 W.
T. 18 N.
2 075 000 FEET
690 000 FEET
680 000 FEET
2 060 000 FEET
1 Mile
5 000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
Wagner Creek
MIDDLE LOUP RIVER
Comstock
Wescott
DOUGLAS GROVE CEMETERY
BURLINGTON NORTHERN
CANAL
CANAL NO. 1
S-21C
water
VALLEY COUNTY
1
2
3
4
5
8
9
10
11
12
13
14
15
16
17

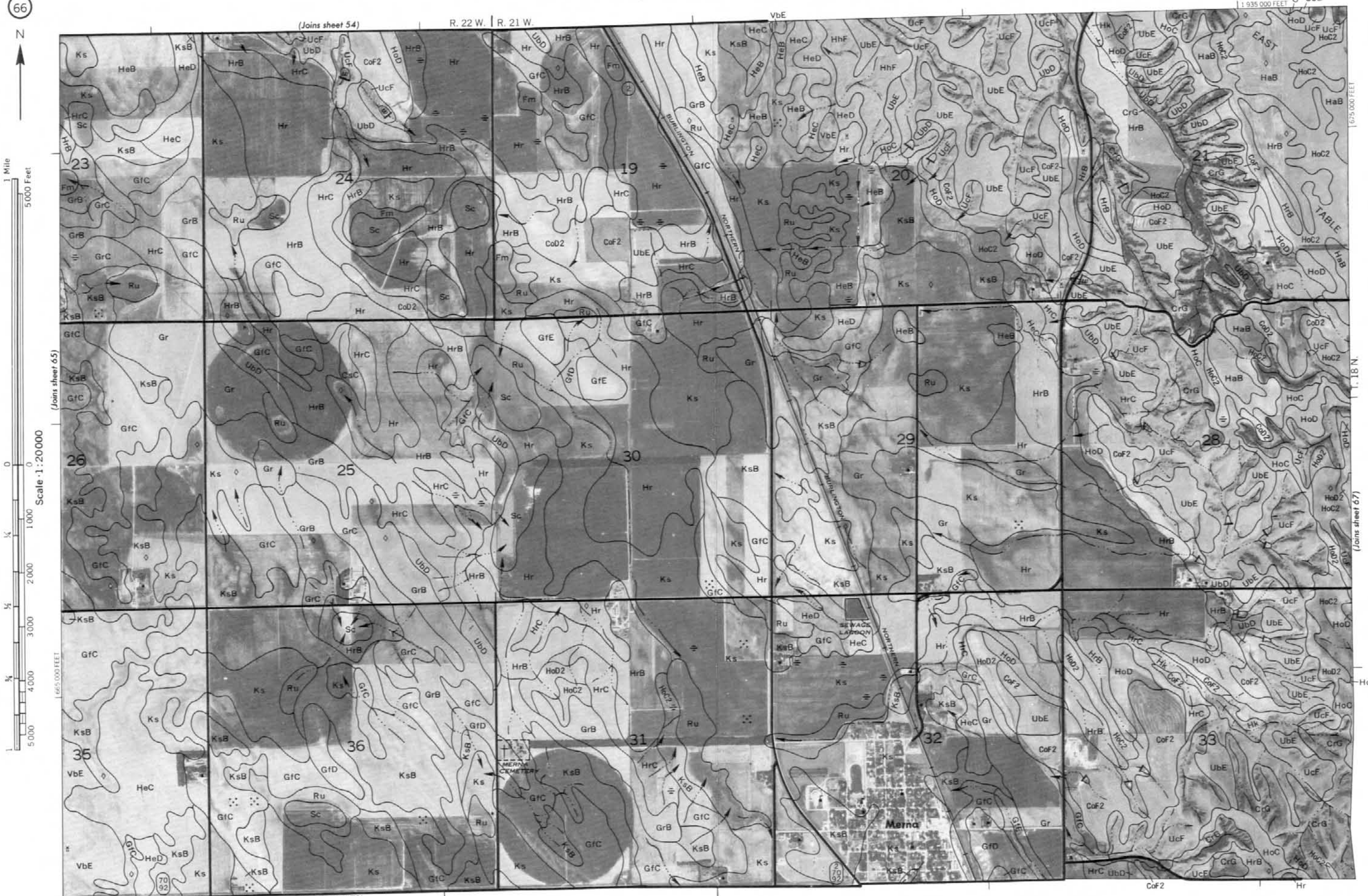

61
N
1 795 000 FEET
R. 25 W.
(Joins sheet 49)
675 000 FEET
T. 18 N.
LOGAN COUNTY
(Joins sheet 62)
665 000 FEET
(Joins sheet 73)
1 815 000 FEET
1 Mile
5000 Feet
0
0
¼
1000
½
2000
¾
3000
4000
1
5000
Scale 1:20000
19
20
21
22
23
30
29
28
27
26
31
32
33
34
35
Table
Judkins
water
VaE
VaF
VbE
HhF
AnC
VbD
VbB
HeD
GhG
HoD2
HoC2
HoC
HrB
GfE
GfD
UcF
HeE
HrC
Fm
CoF2
Hk
HeC
CrG
VaB
An
Ks
HeB
Ru
DuB
HpB
UbE
VaD
HeC

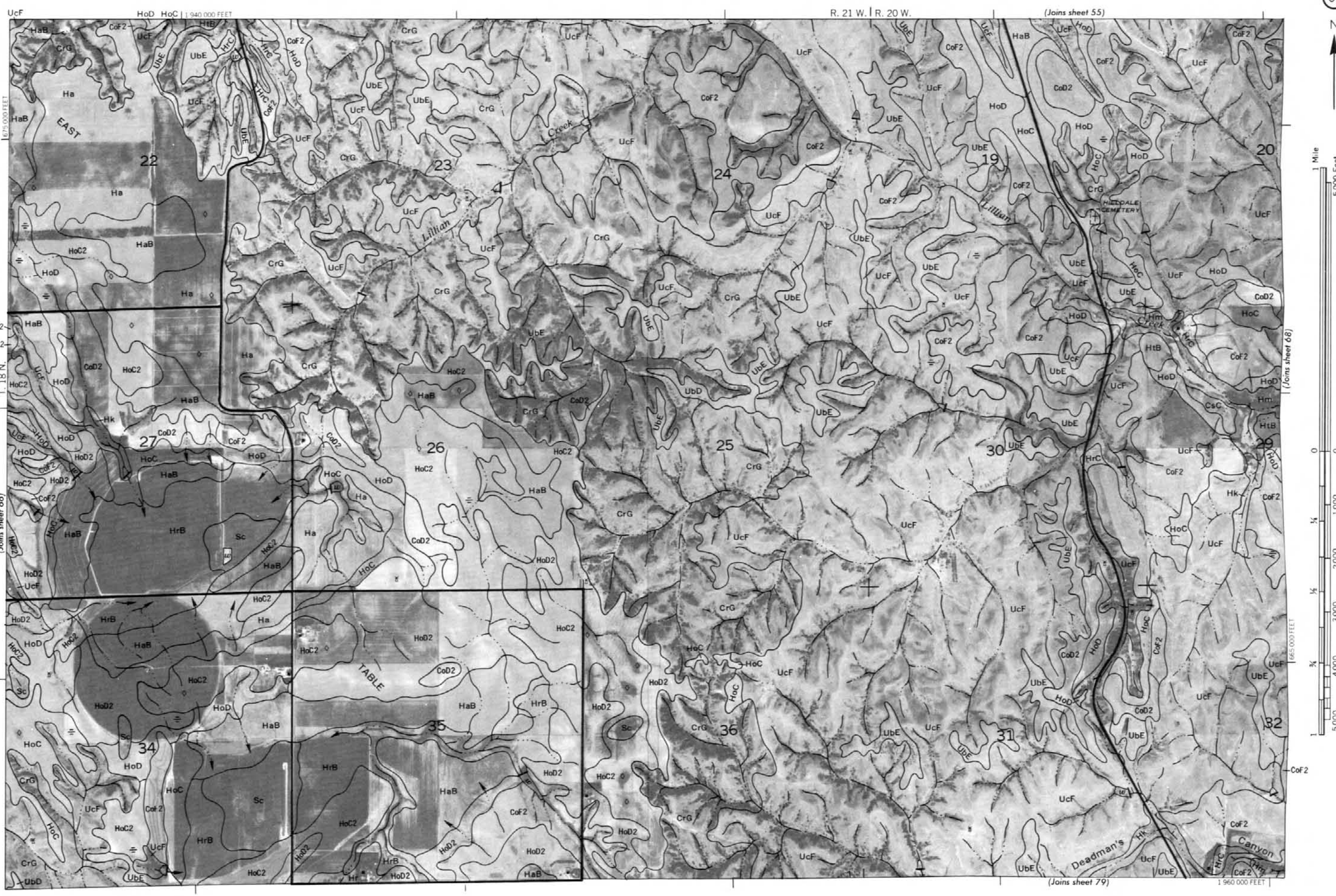

62
N
(Joins sheet 50)
R. 25 W.
R. 24 W.
1 840 000 FEET
675 000 FEET
T. 18 N.
(Joins sheet 61)
(Joins sheet 63)
(Joins sheet 74)
1 820 000 FEET
665 000 FEET
Scale 1:20000
1 Mile
5000 Feet
23
24
19
20
21
26
25
30
29
28
35
36
31
32
33

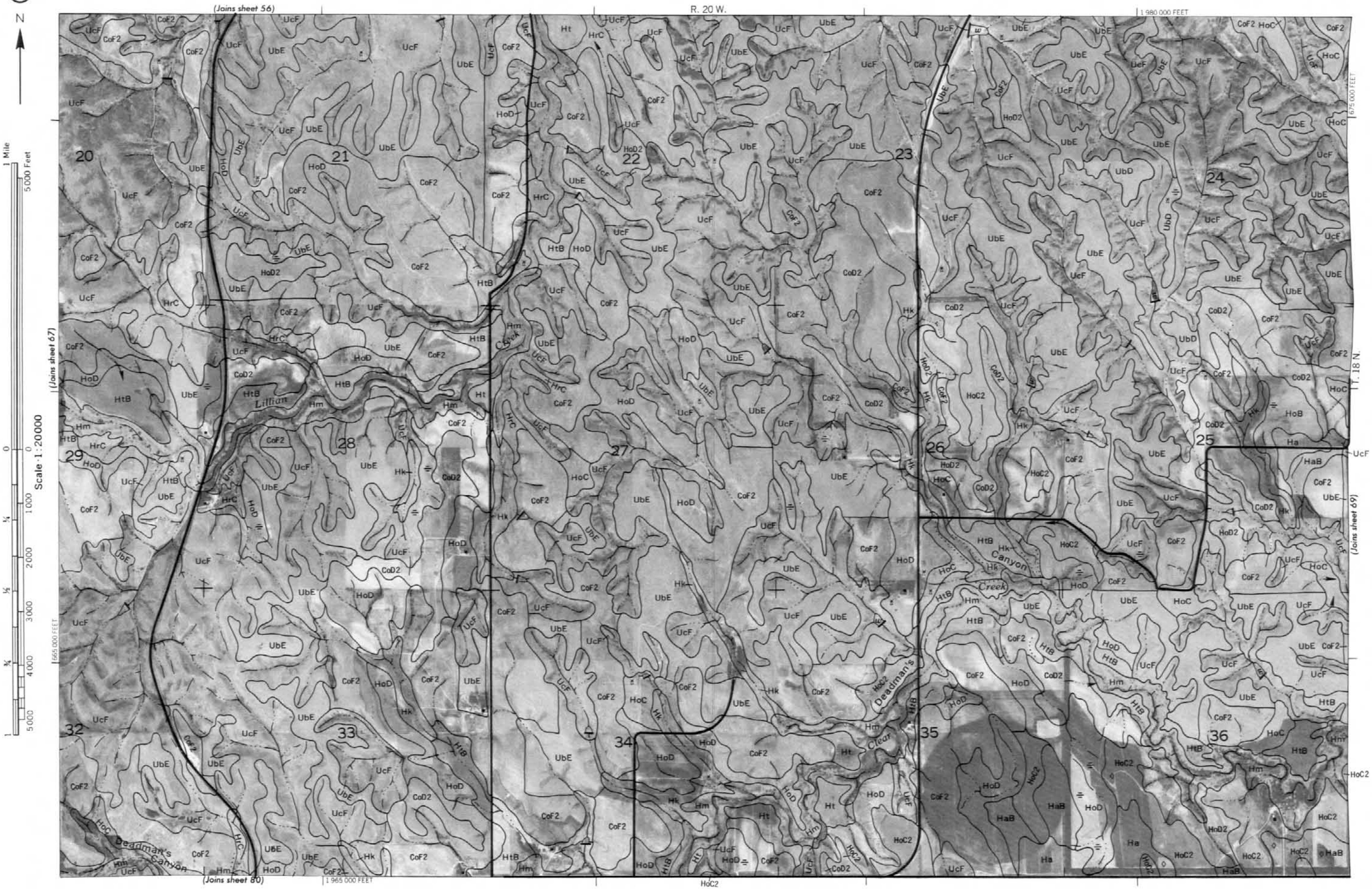

1 845 000 FEET
R. 24 W. | R. 23 W.
(Joins sheet 51)
675 000 FEET
T. 18 N.
(Joins sheet 62)
(Joins sheet 64)
(Joins sheet 75)
665 000 FEET
1 865 000 FEET
22
23
24
19
20
27
26
25
30
29
34
35
36
31
32
Dry Creek
WEST
TABLE
water
Pleasant Hill
N
1 Mile
5000 Feet
Scale 1:20000

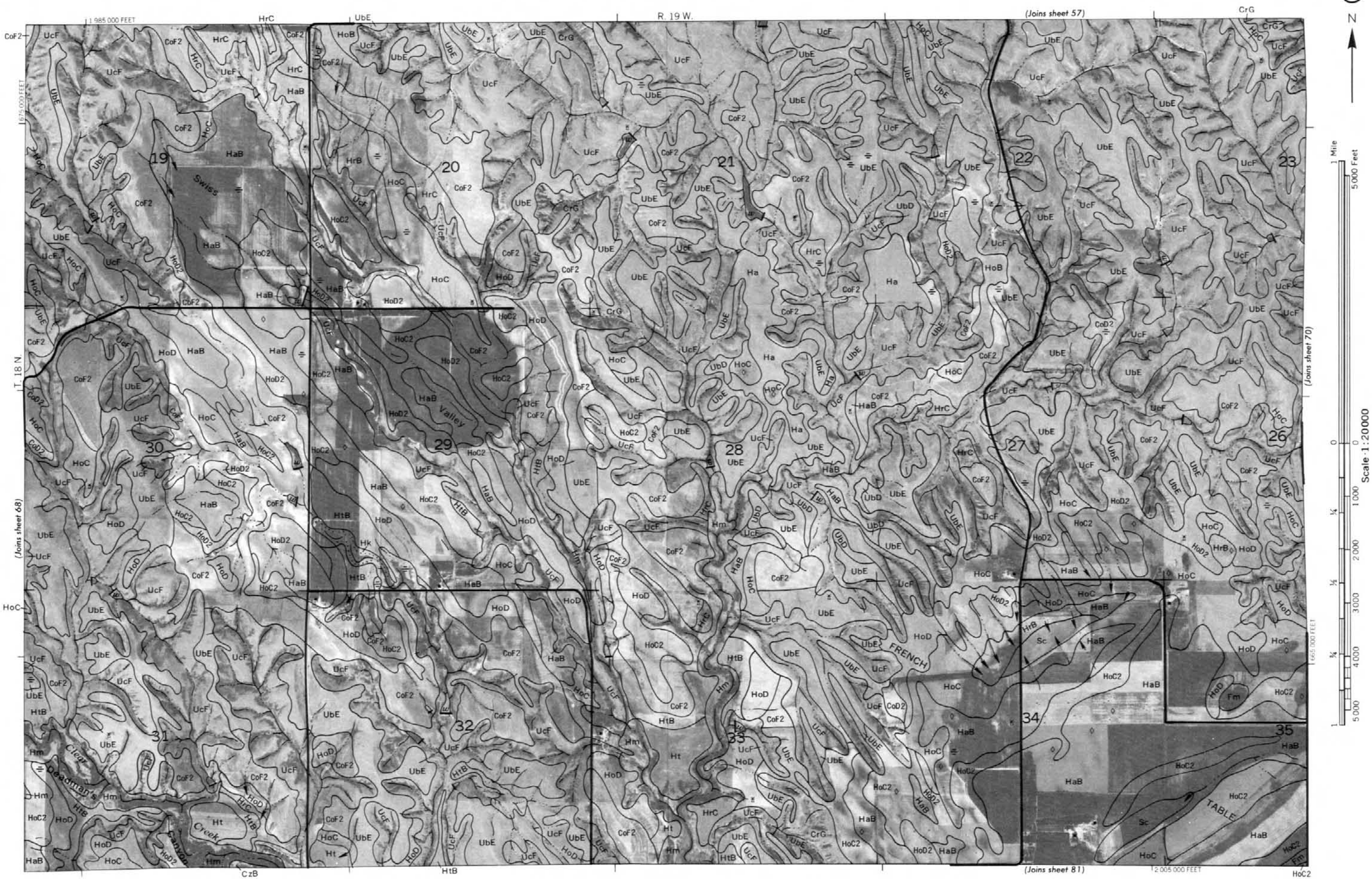

N
(Joins sheet 52)
R. 23 W.
1 885 000 FEET
675 000 FEET
(Joins sheet 63)
(Joins sheet 65)
T. 18 N.
665 000 FEET
1 870 000 FEET
(Joins sheet 76)
1 Mile
5000 Feet
Scale 1:20000
WEST
TABLE
ORTELLO CEMETERY
20
21
22
23
24
25
26
27
28
29
32
33
34
35
36

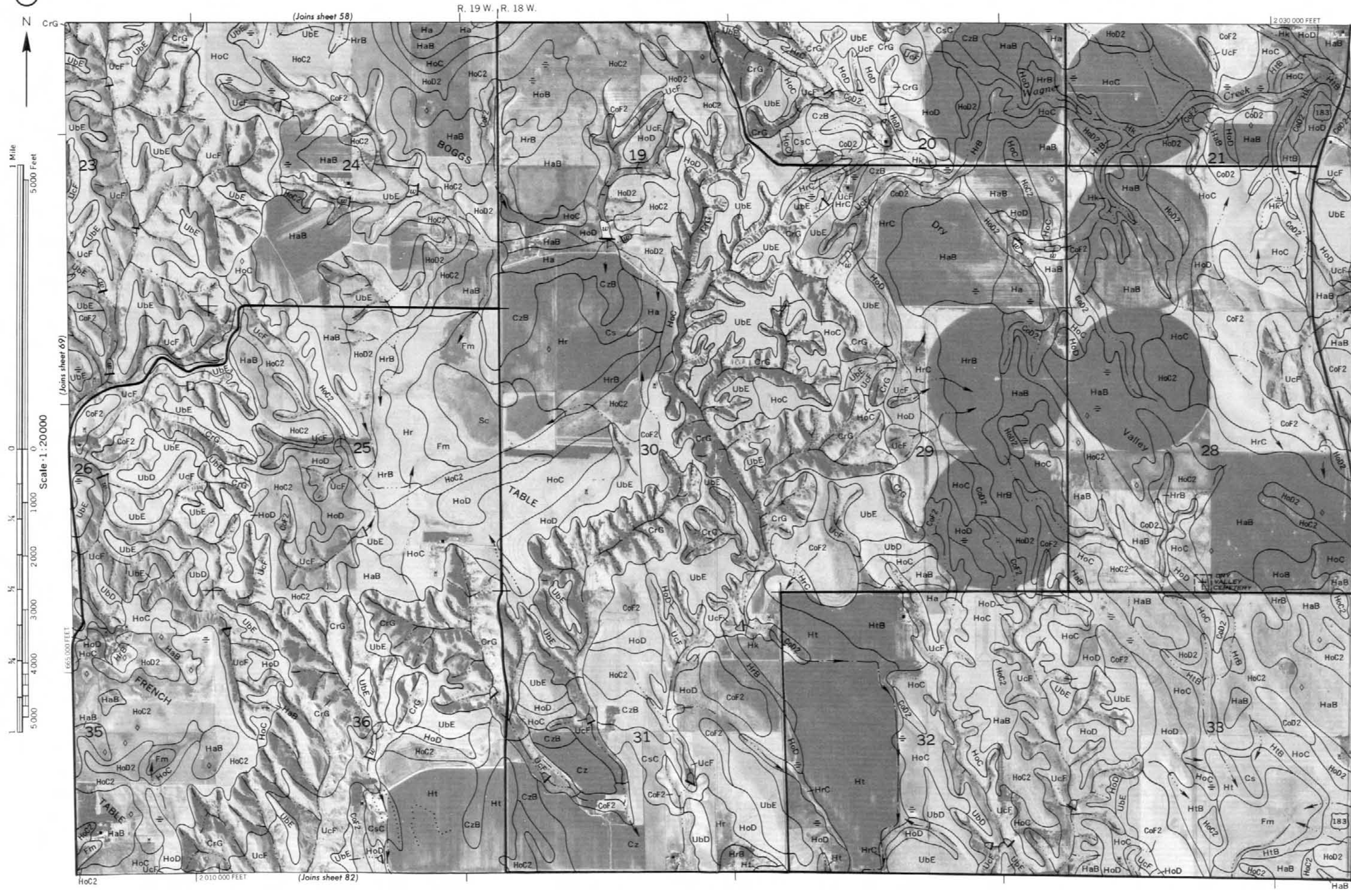

65
N
1 890 000 FEET
675 000 FEET
665 000 FEET
1 910 000 FEET
R. 22 W.
T. 18 N.
(Joins sheet 53)
(Joins sheet 64)
(Joins sheet 66)
(Joins sheet 77)
DALE CEMETERY
Dale
Ortello
Valley
19
20
21
22
23
30
29
28
27
26
31
32
33
34
35
1 Mile
5000 Feet
Scale 1:20 000
0
¼
½
¾
1
1000
2000
3000
4000
5000

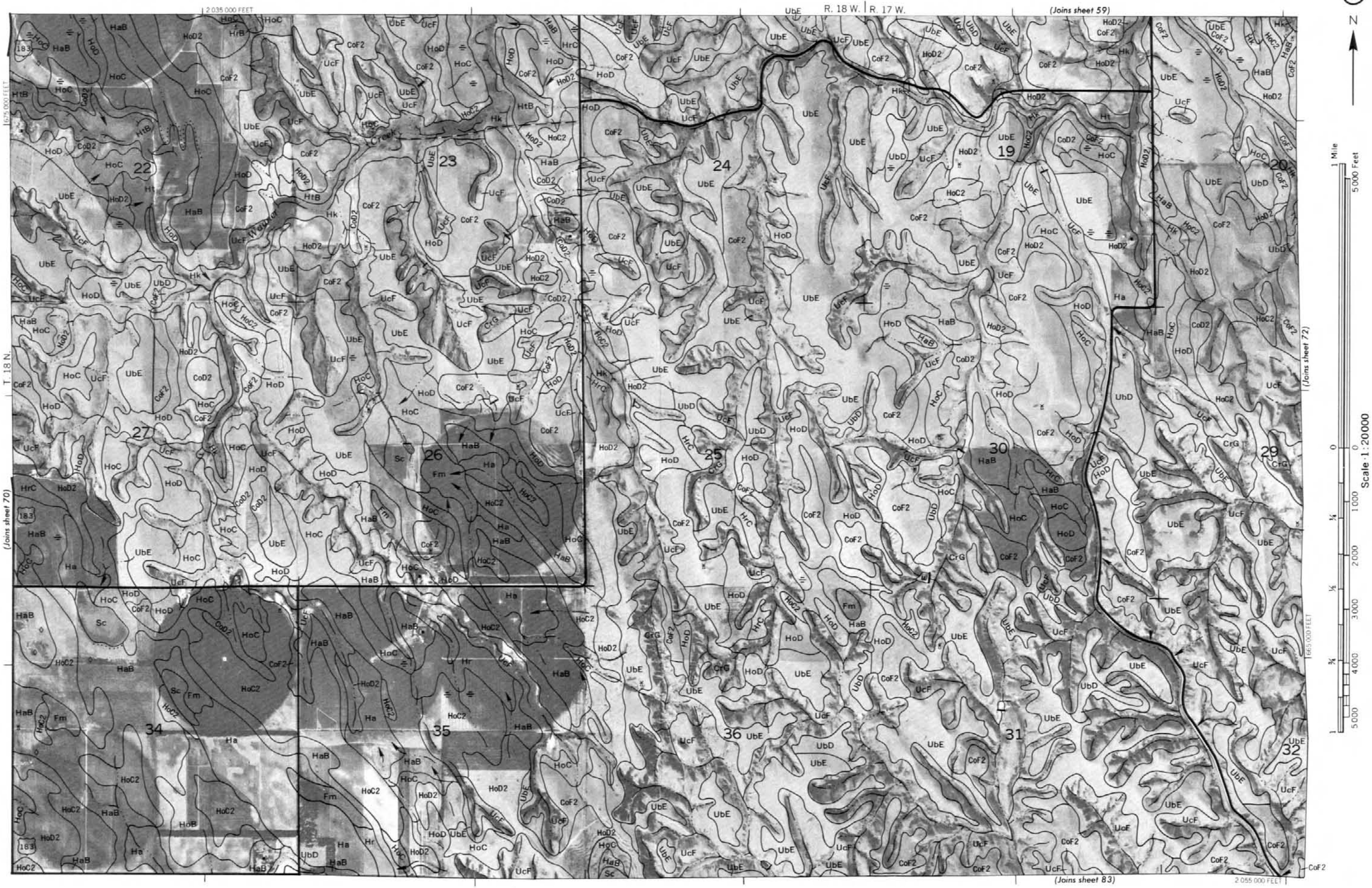

N
(Joins sheet 54)
R. 22 W.
R. 21 W.
1 935 000 FEET
675 000 FEET
T. 18 N.
(Joins sheet 65)
(Joins sheet 67)
(Joins sheet 78)
665 000 FEET
1 915 000 FEET
1 Mile
5000 Feet
Scale 1:20000
EAST TABLE
BURLINGTON NORTHERN
SEWAGE LAGOON
MERNA CEMETERY
Merna
23
24
19
20
21
26
25
30
29
28
35
36
31
32
33

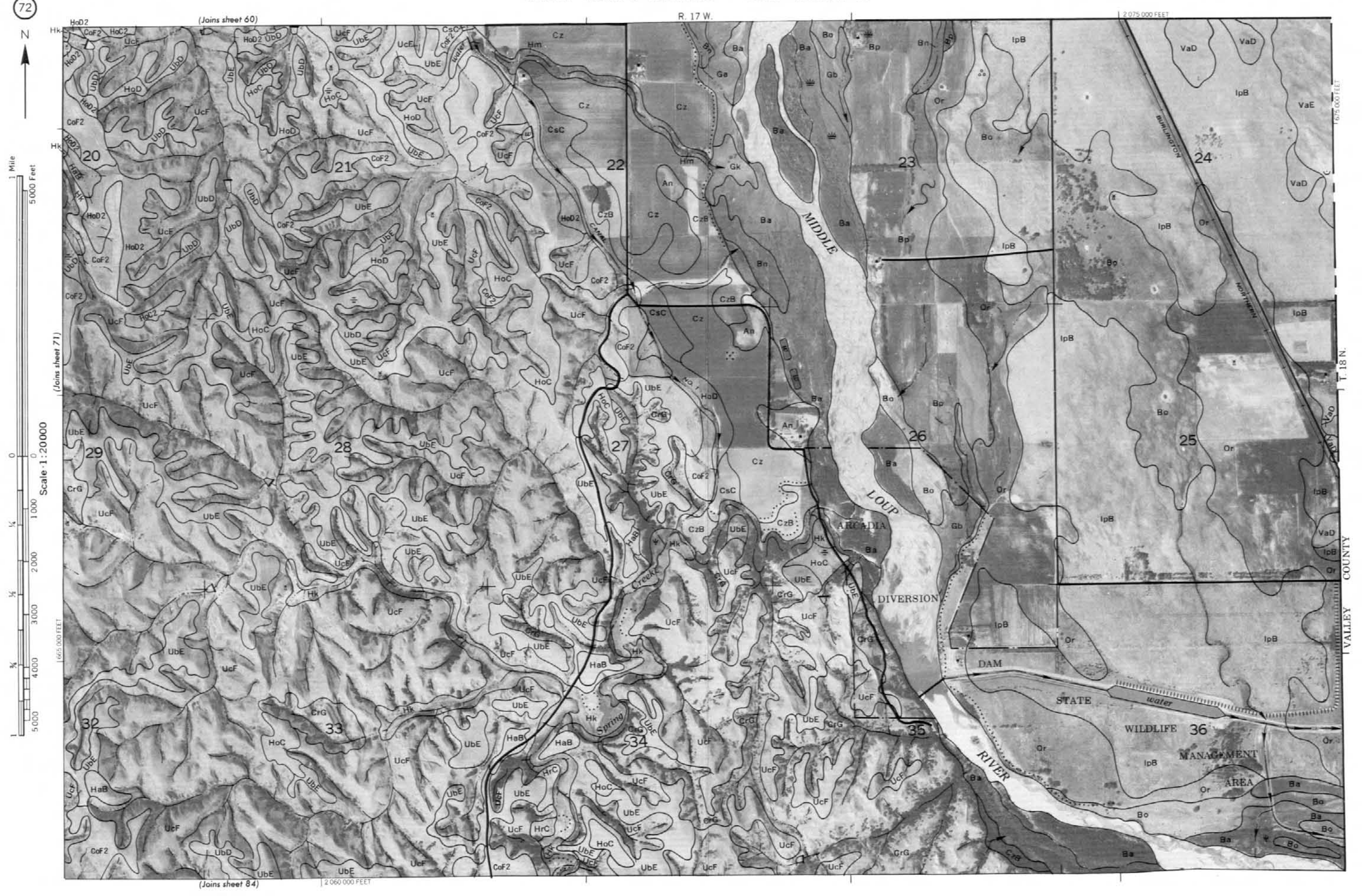

(Joins sheet 55)
(Joins sheet 68)
(Joins sheet 79)
(Joins sheet 66)
R. 21 W. | R. 20 W.
T. 18 N.
1 940 000 FEET
1 960 000 FEET
675 000 FEET
665 000 FEET
EAST
TABLE
Lillian
Creek
Deadman's
Canyon
HILLDALE CEMETERY
N
1 Mile
5 000 Feet
Scale 1:20000


(Joins sheet 56)
R. 20 W.
1 980 000 FEET
675 000 FEET
(Joins sheet 67)
(Joins sheet 69)
T. 18 N.
665 000 FEET
(Joins sheet 80)
1 965 000 FEET
N
1 Mile
5000 Feet
Scale 1:20 000
0
1000
2000
3000
4000
5000
20
21
22
23
24
25
26
27
28
29
32
33
34
35
36
Lillian
Creek
Canyon
Creek
Deadman's
Clear
Deadman's
Canyon

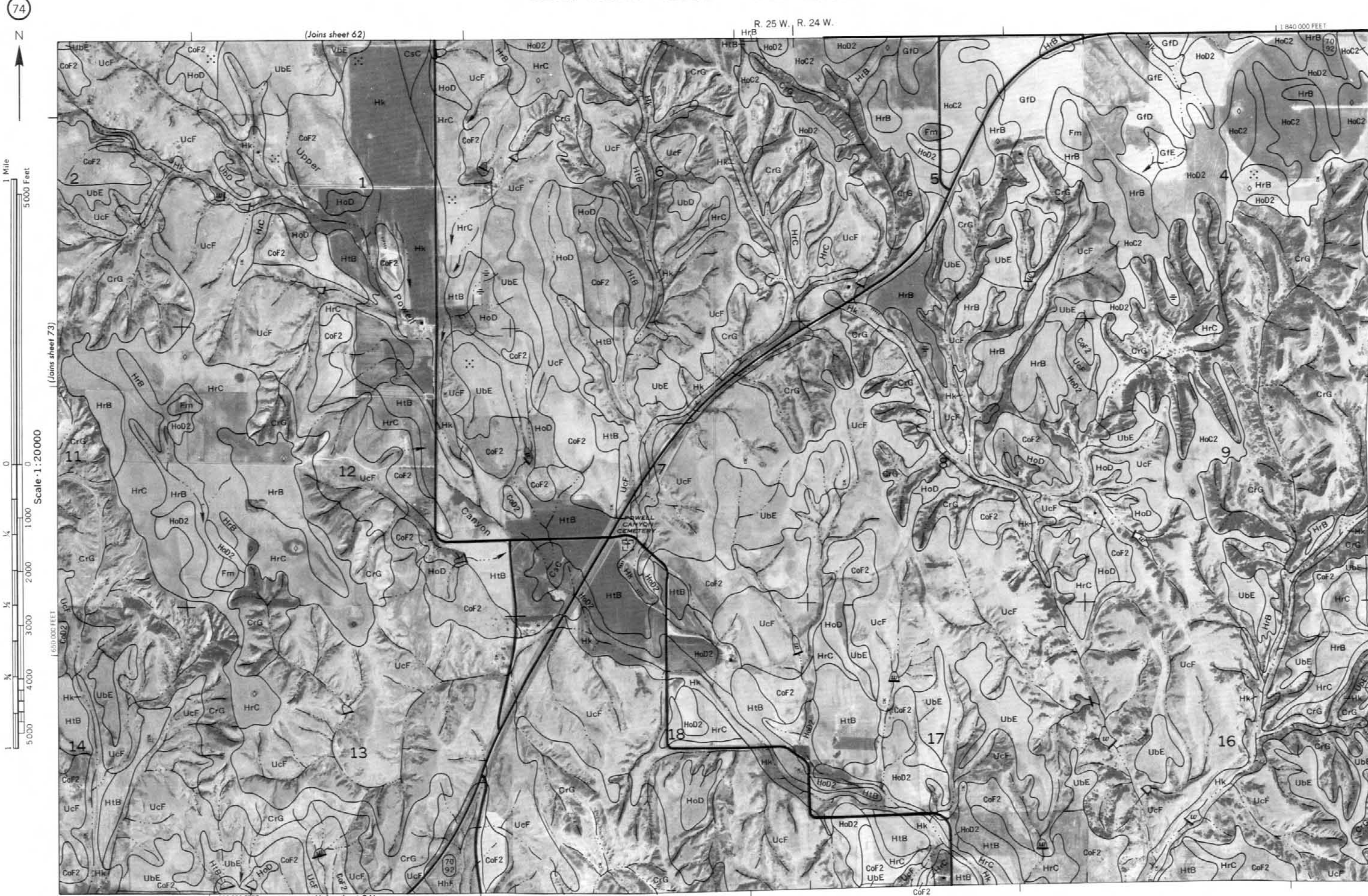

(Joins sheet 57)
R. 19 W.
T. 18 N.
(Joins sheet 70)
(Joins sheet 68)
(Joins sheet 81)
1 985 000 FEET
2 005 000 FEET
675 000 FEET
665 000 FEET
N
1 Mile
5000 Feet
Scale 1:20000
Swiss
Valley
FRENCH
TABLE
Clear
Creek
Deadman's
Canyon
19
20
21
22
23
26
27
28
29
30
31
32
33
34
35


N
(Joins sheet 58)
R. 19 W.
R. 18 W.
2 030 000 FEET
675 000 FEET
(Joins sheet 69)
(Joins sheet 71)
T. 18 N.
665 000 FEET
2 010 000 FEET
(Joins sheet 82)
1 Mile
5000 Feet
Scale 1:20000
BOGGS
TABLE
FRENCH
TABLE
Dry
Valley
Wagner
Creek
DRY VALLEY CEMETERY
183
19
20
21
23
24
25
26
28
29
30
31
32
33
35
36

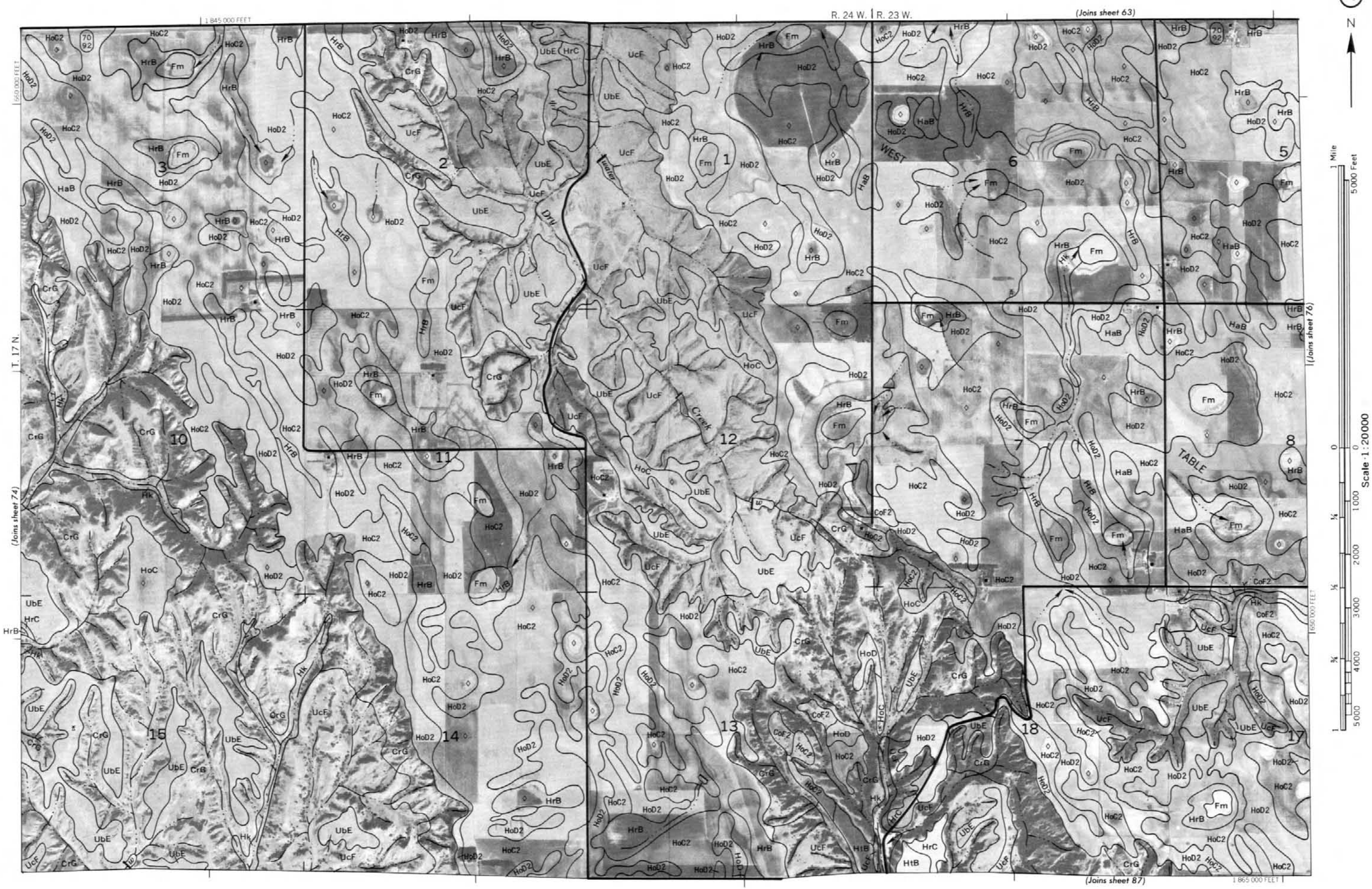

2 035 000 FEET
R. 18 W.
R. 17 W.
(Joins sheet 59)
N
675 000 FEET
T. 18 N.
(Joins sheet 70)
(Joins sheet 72)
(Joins sheet 83)
665 000 FEET
2 055 000 FEET
1 Mile
5000 Feet
Scale 1:20000
22
23
24
19
20
27
26
25
30
29
34
35
36
31
32
Wagon Creek

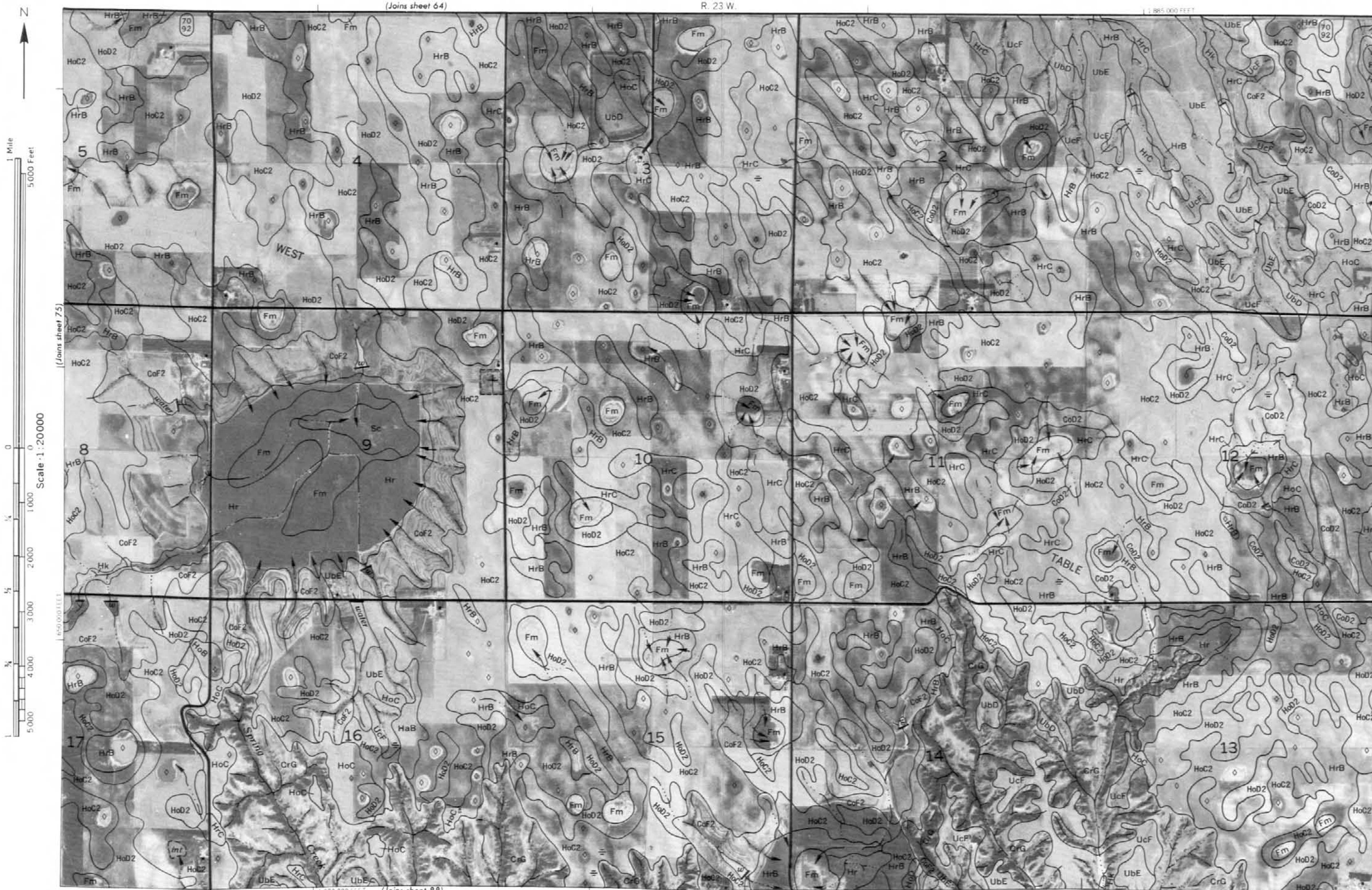

72
N
(Joins sheet 60)
(Joins sheet 71)
(Joins sheet 84)
R. 17 W.
T. 18 N.
2 075 000 FEET
675 000 FEET
665 000 FEET
2 060 000 FEET
Scale 1:20000
1 Mile
5000 Feet
MIDDLE
LOUP
RIVER
ARCADIA
DIVERSION
DAM
STATE
WILDLIFE
MANAGEMENT
AREA
BURLINGTON
NORTHERN
VALLEY
COUNTY
Spring
Creek
water

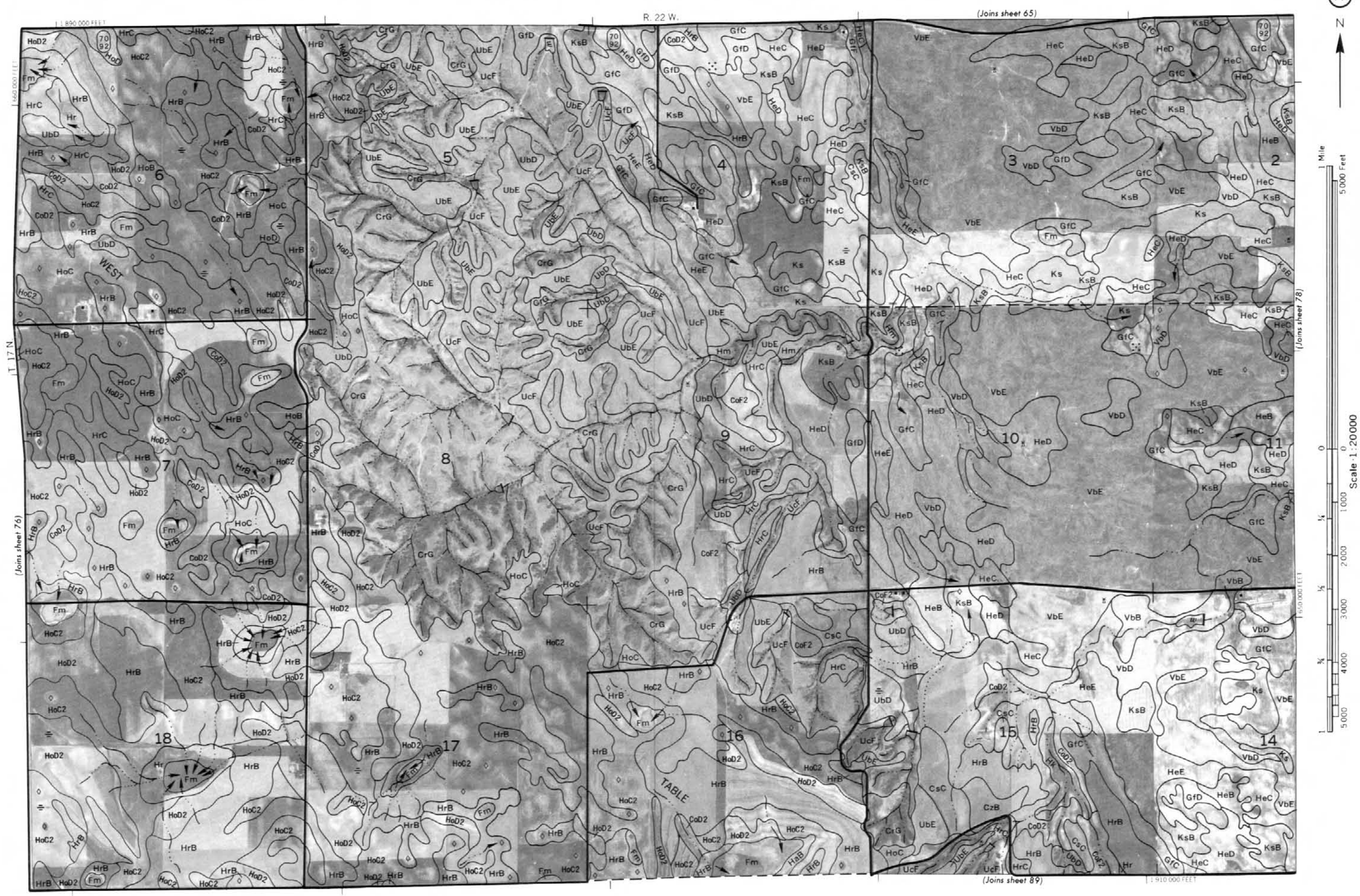

1 795 000 FEET
R. 25 W.
(Joins sheet 61)
(Joins sheet 74)
(Joins sheet 85)
1 815 000 FEET
660 000 FEET
650 000 FEET
T. 17 N.
LOGAN COUNTY
N
1 Mile
5000 Feet
Scale 1:20000
Judkins Table
Mills
Deads Gulch
Devils Den Canyon
Scenic Overlook
Radio Tower
Valley
South Loup River
1
2
3
4
5
6
7
8
9
10
11
14
15
16
17
18

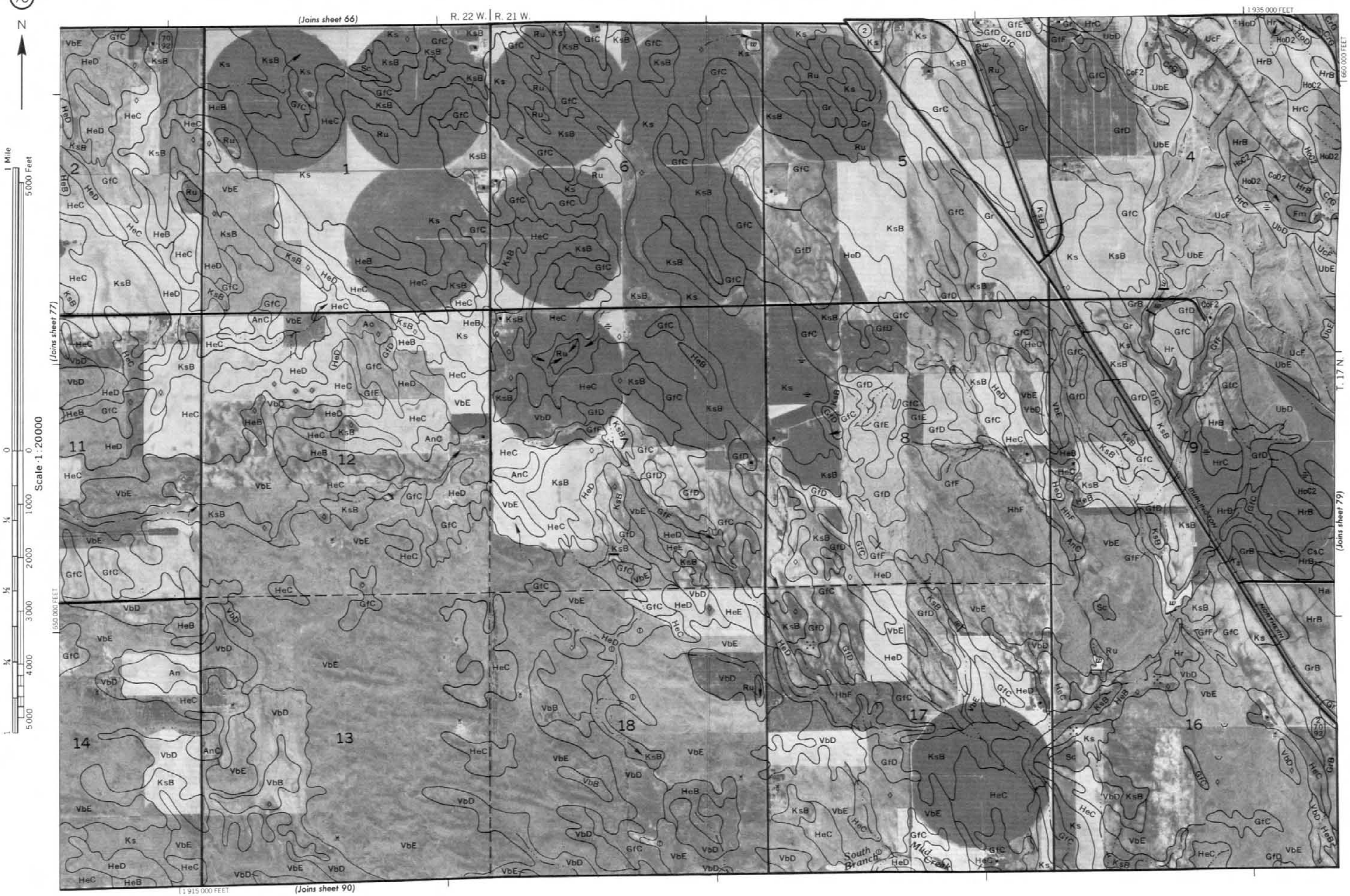

74
N
(Joins sheet 62)
(Joins sheet 73)
(Joins sheet 75)
(Joins sheet 86)
R. 25 W.
R. 24 W.
T. 17 N.
1 840 000 FEET
660 000 FEET
650 000 FEET
1 820 000 FEET
Scale 1:20000
1 Mile
5000 Feet
Upper
Powell
Canyon
POWELL CANYON CEMETERY
70
92

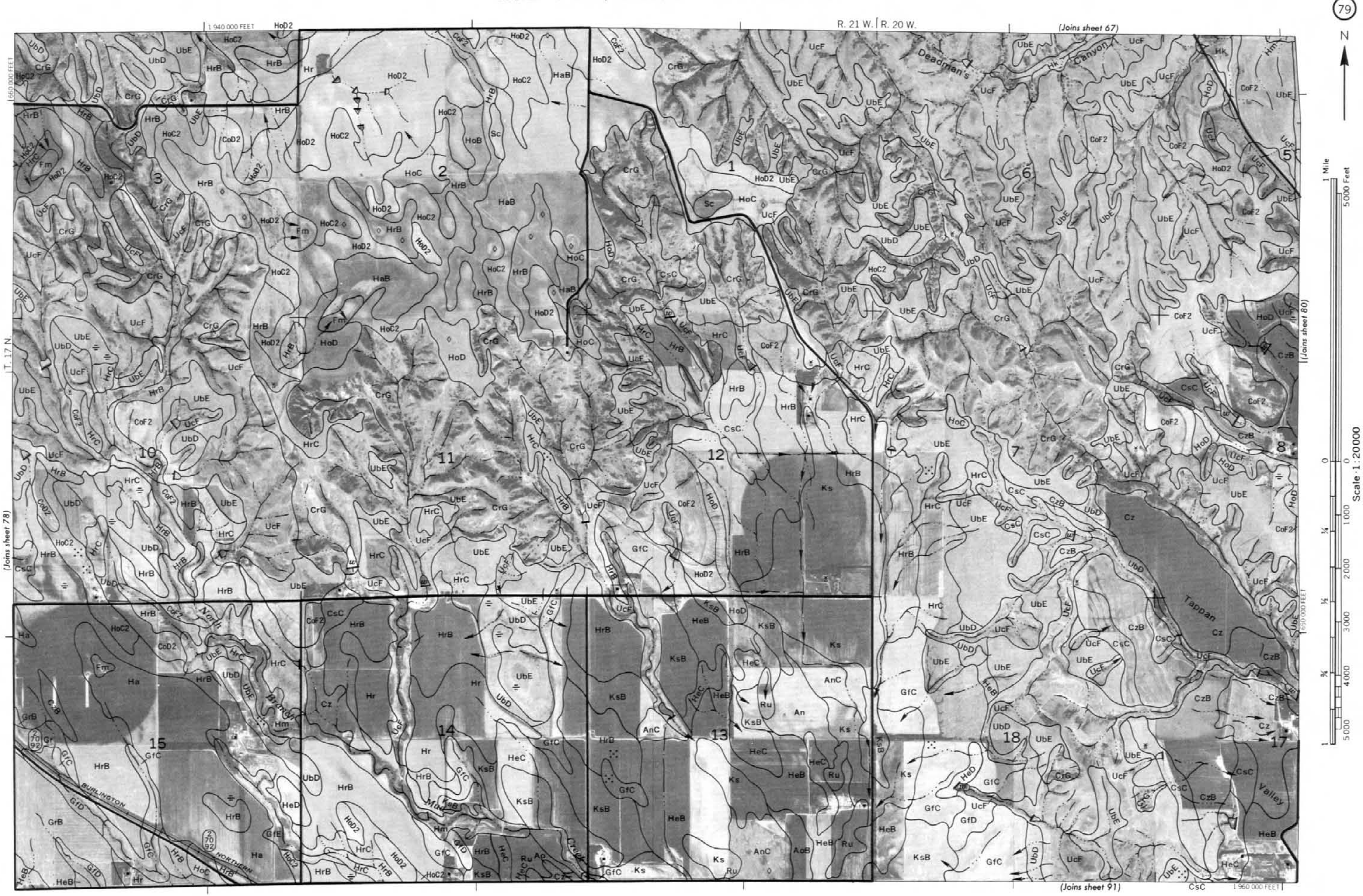
CUSTER COUNTY, NEBRASKA — SHEET NUMBER 75



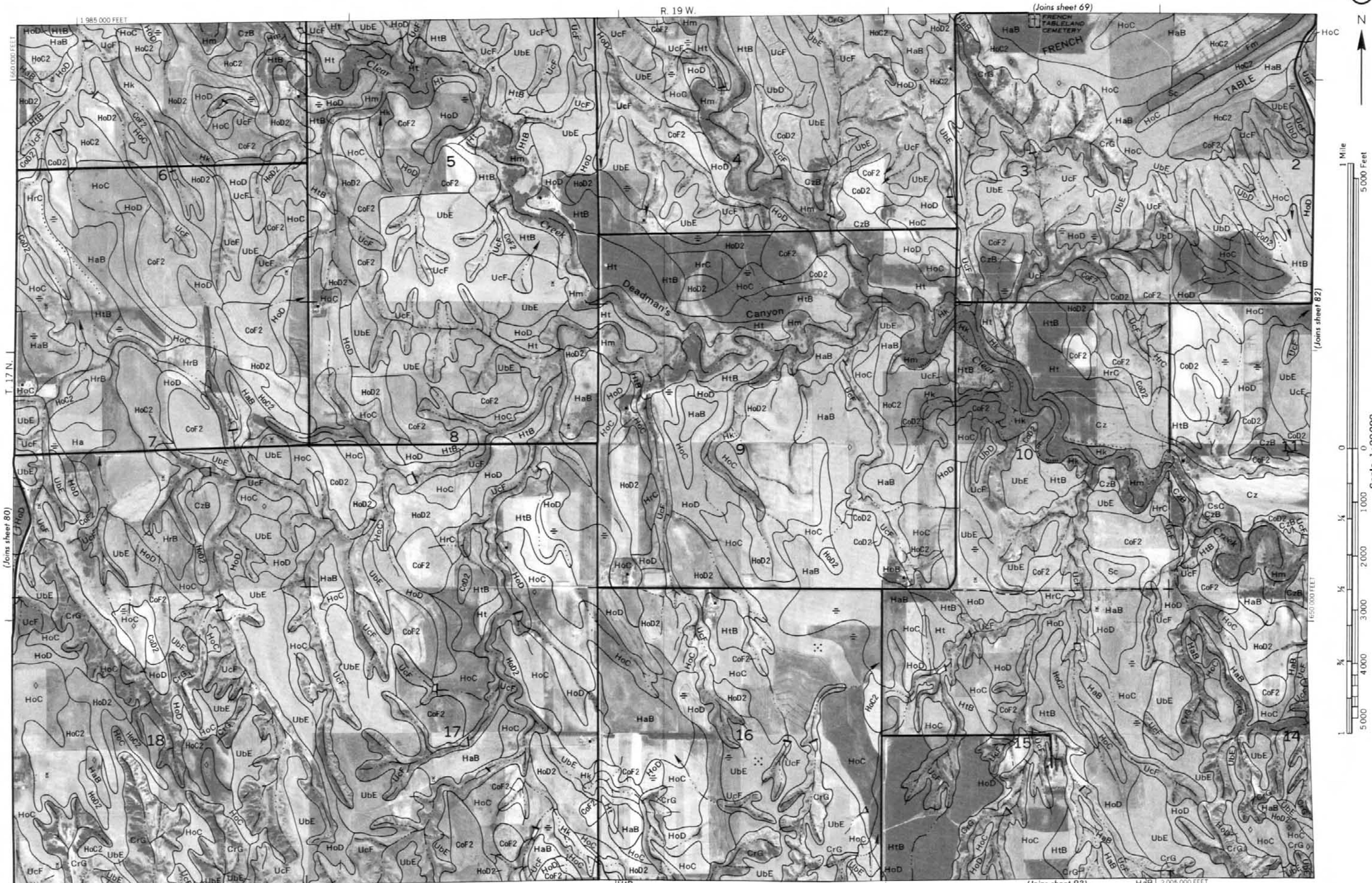

N
(Joins sheet 64)
R. 23 W.
1 885 000 FEET
(Joins sheet 75)
(Joins sheet 77)
(Joins sheet 88)
1 870 000 FEET
650 000 FEET
T. 17 N.
1 Mile
5000 Feet
Scale 1:20000
WEST
TABLE
Spring
Creek
water
1
2
3
4
5
8
9
10
11
12
13
14
15
16
17

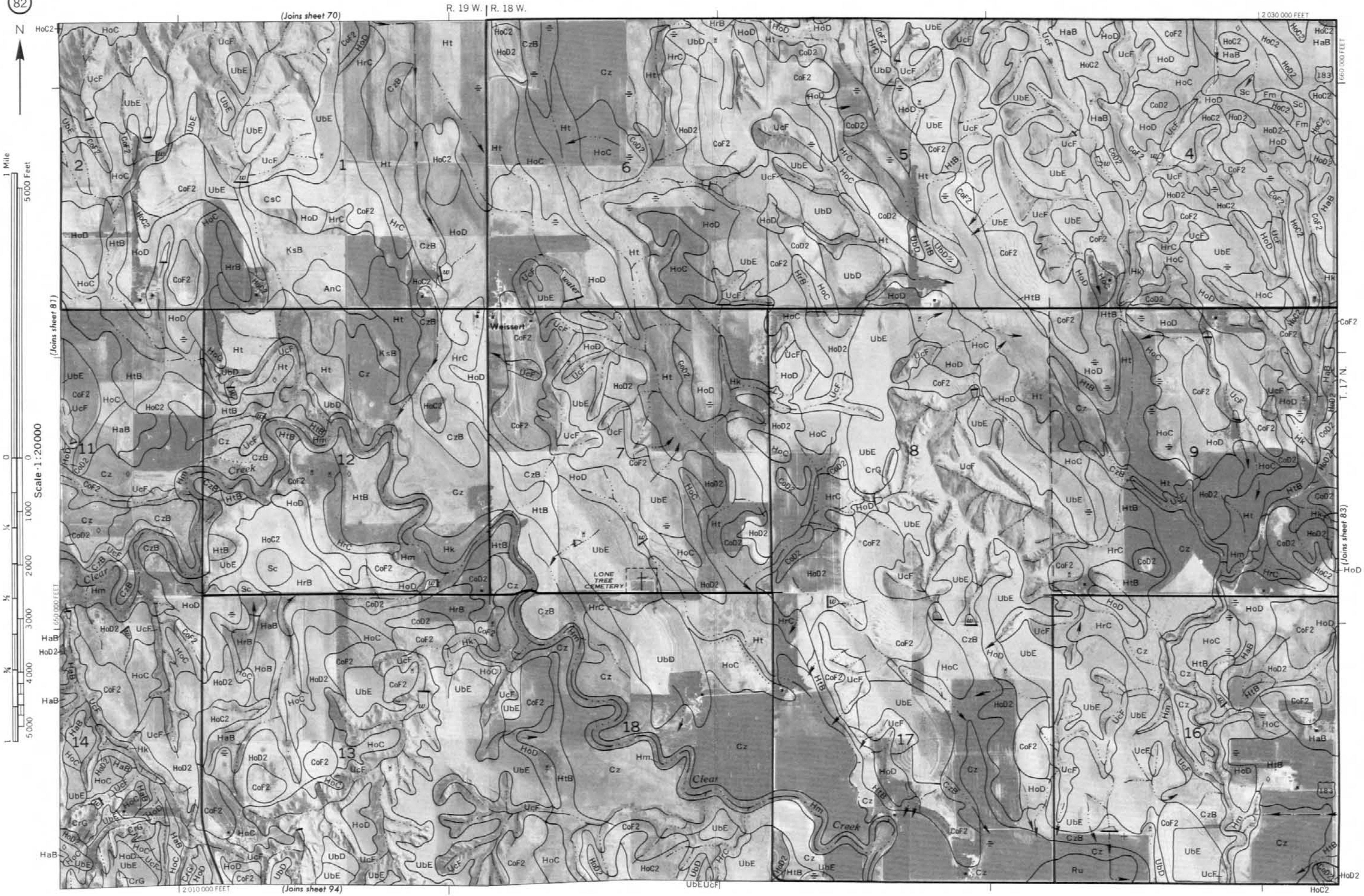

77
N
R. 22 W.
T. 17 N.
(Joins sheet 65)
(Joins sheet 78)
(Joins sheet 89)
(Joins sheet 76)
1 890 000 FEET
1 910 000 FEET
460 000 FEET
450 000 FEET
WEST
TABLE
1 Mile
5000 Feet
Scale 1:20000
0
¼
½
¾
1
0
1000
2000
3000
4000
5000
2
3
4
5
6
7
8
9
10
11
14
15
16
17
18

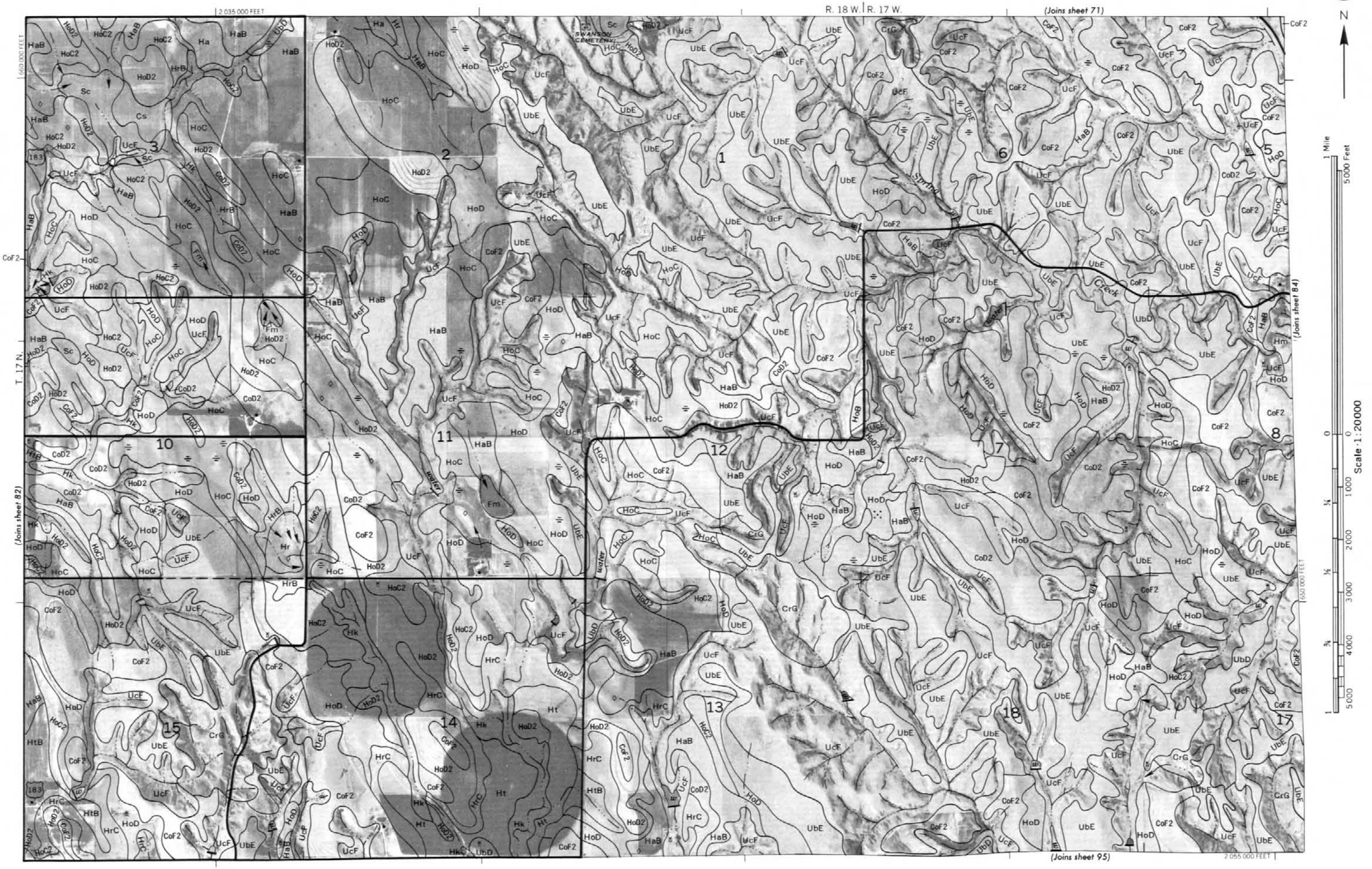

N
(Joins sheet 66)
R. 22 W.
R. 21 W.
1 935 000 FEET
660 000 FEET
(Joins sheet 77)
T. 17 N.
(Joins sheet 79)
650 000 FEET
1 915 000 FEET
(Joins sheet 90)
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
¼
½
¾
1
South Branch
Mud Creek
1
2
4
5
6
7
8
9
11
12
13
14
16
17
18

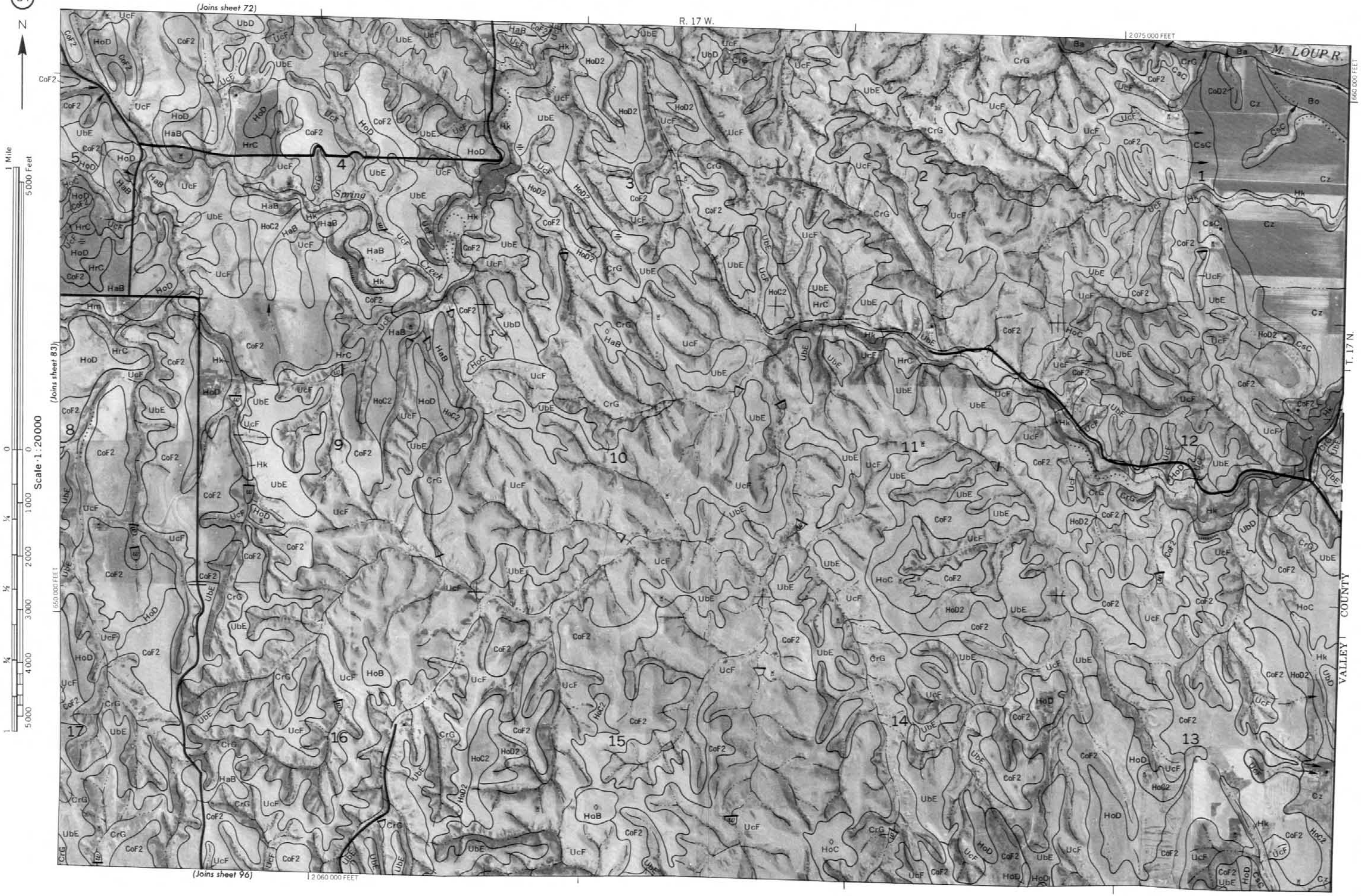

79
N
1 940 000 FEET
R. 21 W. | R. 20 W.
(Joins sheet 67)
(Joins sheet 80)
(Joins sheet 78)
(Joins sheet 91)
1 960 000 FEET
650 000 FEET
T. 17 N.
Deadman's Canyon
Tappan Valley
North Branch
Mud Creek
BURLINGTON NORTHERN
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000


N
(Joins sheet 68)
(Joins sheet 79)
(Joins sheet 81)
(Joins sheet 92)
R. 20 W.
T. 17 N.
1 980 000 FEET
660 000 FEET
650 000 FEET
1 965 000 FEET
Deadman's Canyon
Clear Creek
Tappan Valley
Broken Bow Municipal Airport
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000


R. 19 W.
(Joins sheet 69)
(Joins sheet 82)
(Joins sheet 93)
(Joins sheet 80)
T. 17 N.
1 985 000 FEET
660 000 FEET
650 000 FEET
2 005 000 FEET
FRENCH TABLELAND CEMETERY
FRENCH
TABLE
Clear
Creek
Deadman's
Canyon
N
1 Mile
5000 Feet
Scale 1:20000

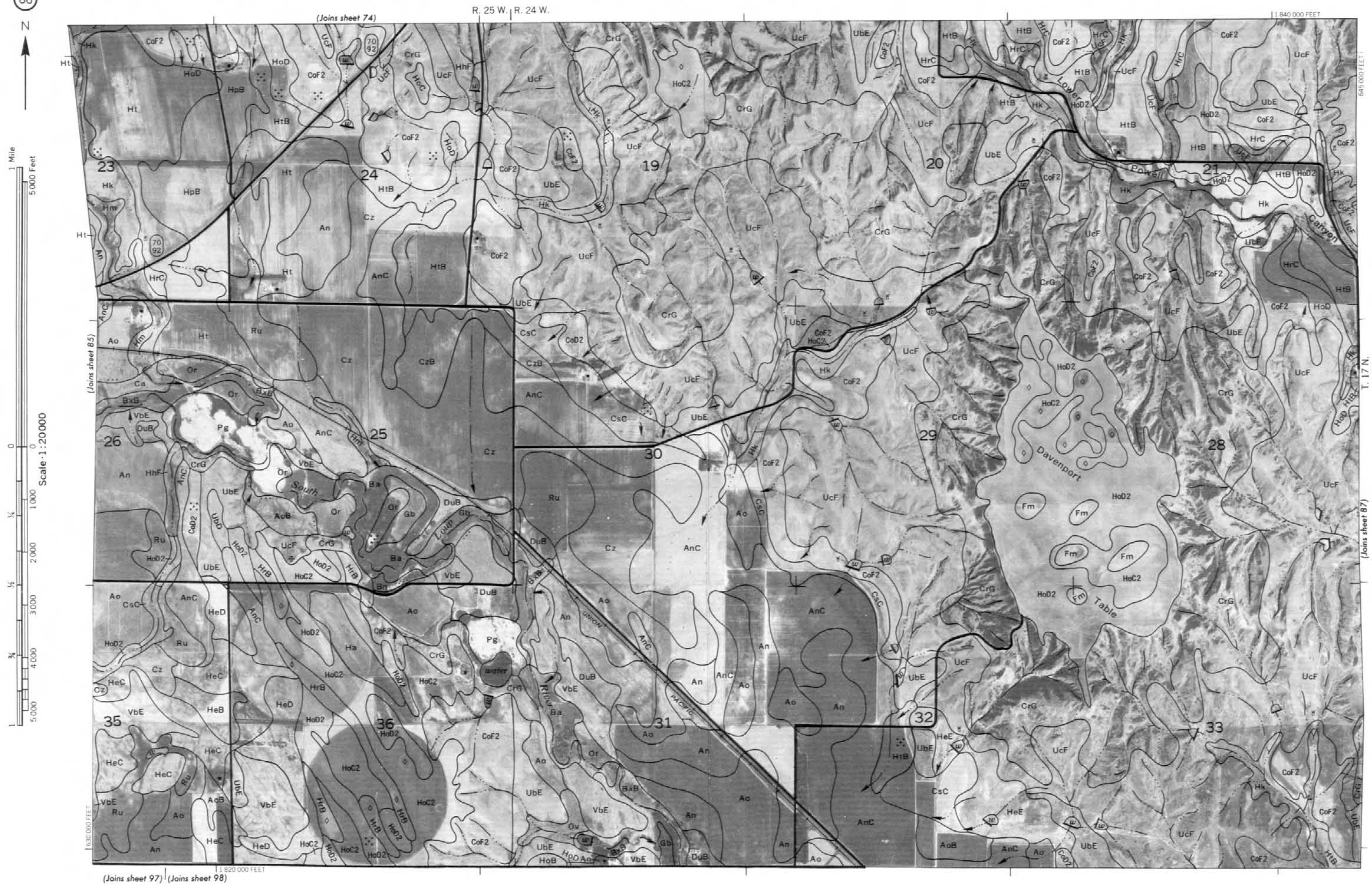

(Joins sheet 70)
R. 19 W. | R. 18 W.
N
1 Mile
5000 Feet
Scale 1:20000
(Joins sheet 81)
(Joins sheet 83)
(Joins sheet 94)
T. 17 N.
2 030 000 FEET
660 000 FEET
650 000 FEET
2 010 000 FEET
Weissert
LONE TREE CEMETERY
Clear Creek
1
2
4
5
6
7
8
9
11
12
13
14
16
17
18

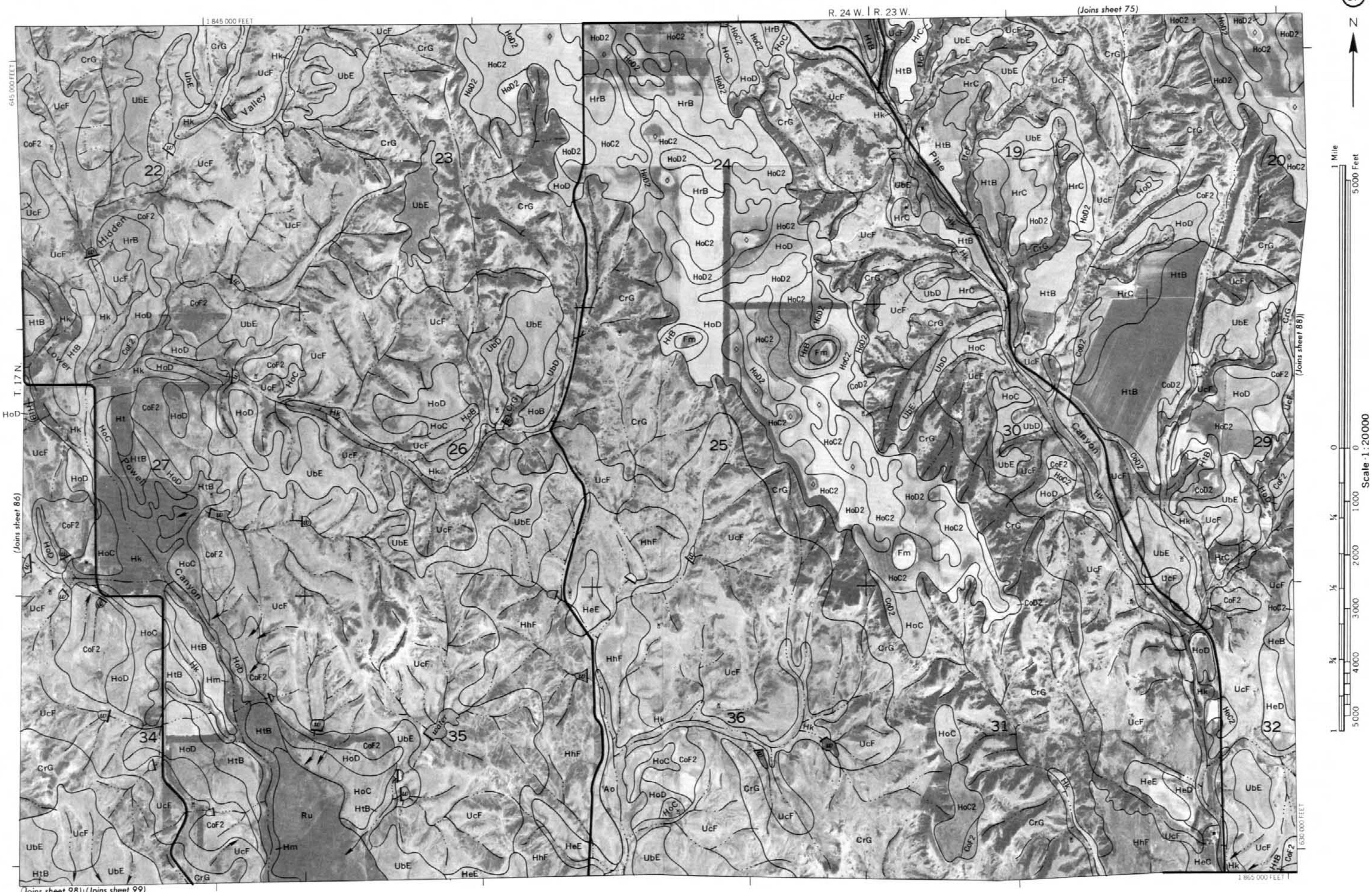

83
N
R. 18 W. | R. 17 W.
(Joins sheet 71)
(Joins sheet 84)
(Joins sheet 95)
(Joins sheet 82)
T. 17 N.
2 035 000 FEET
2 055 000 FEET
650 000 FEET
SWANSON CEMETERY
Spring Creek
water
183
1 Mile
5000 Feet
Scale 1:20000

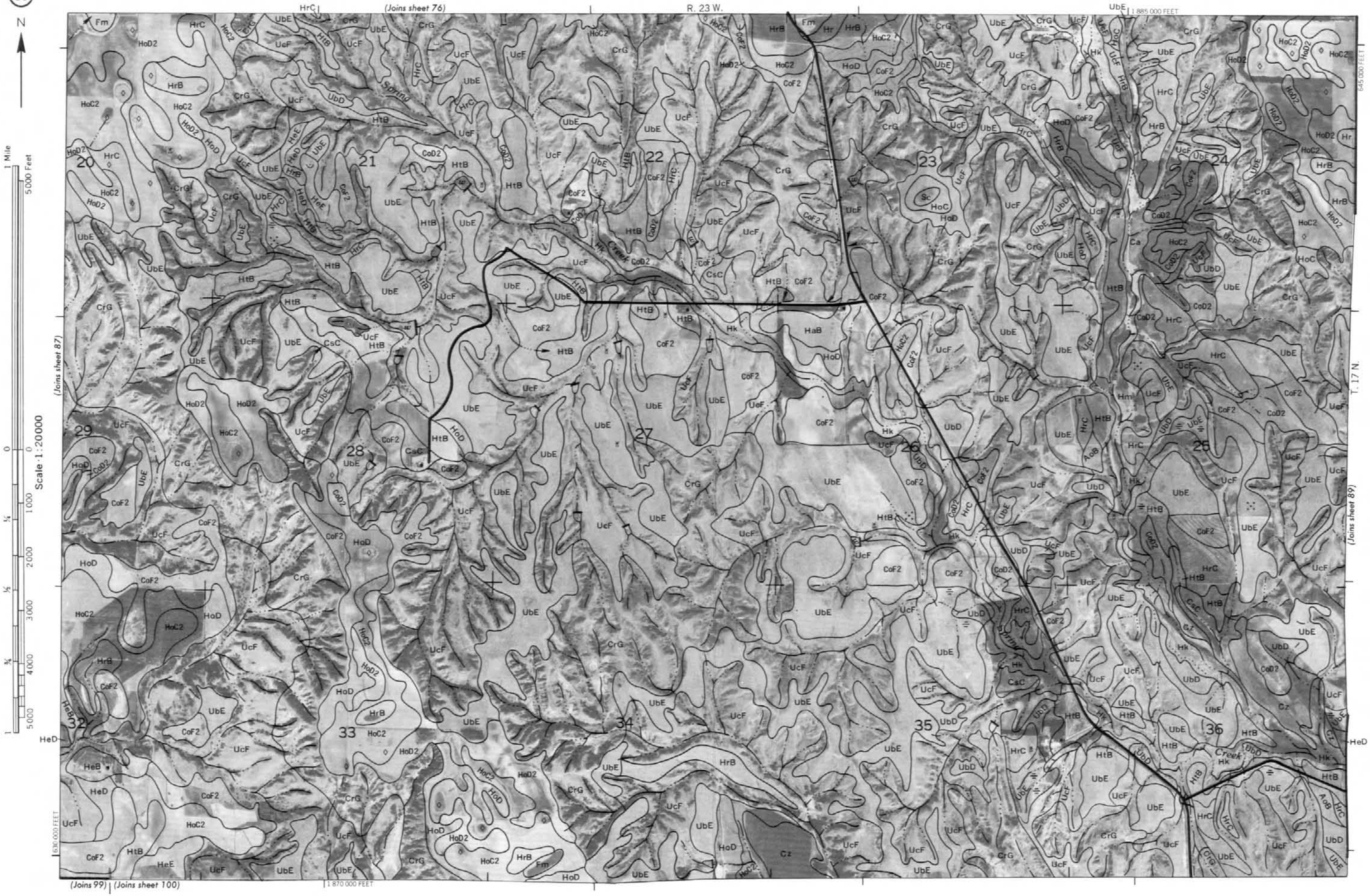

84
N
(Joins sheet 72)
R. 17 W.
2 075 000 FEET
660 000 FEET
M. LOUP R.
Spring
Creek
(Joins sheet 83)
T. 17 N.
VALLEY COUNTY
650 000 FEET
(Joins sheet 96)
2 060 000 FEET
1 Mile
5 000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
¼
½
¾
1
1
2
3
4
5
8
9
10
11
12
13
14
15
16
17

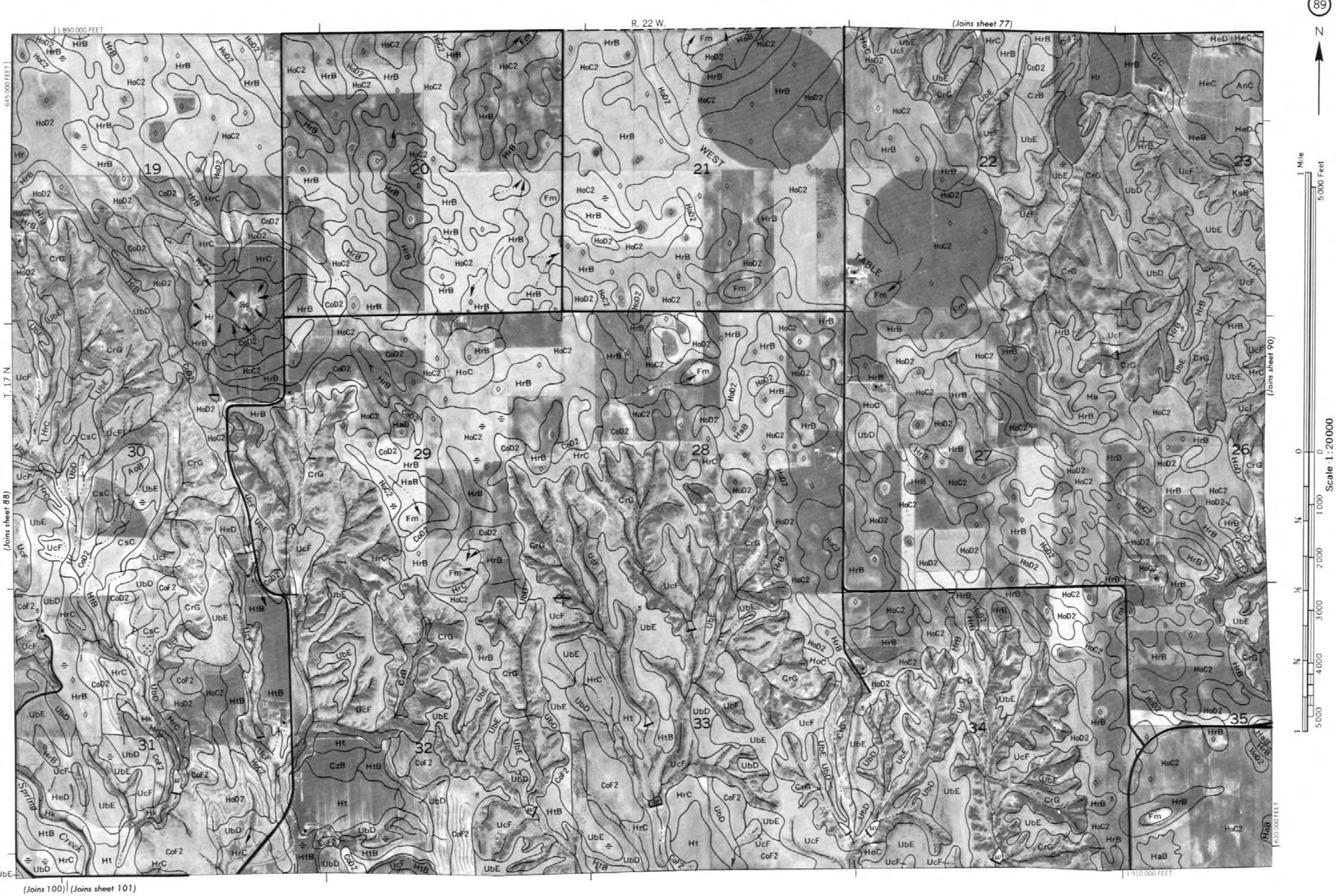

85
N
1 795 000 FEET
645 000 FEET
R. 25 W.
(Joins sheet 73)
(Joins sheet 86)
(Joins sheet 97)
T. 17 N.
LOGAN COUNTY
LINCOLN COUNTY
1 815 000 FEET
630 000 FEET
Arnold
South Loup River
UNION PACIFIC
SEWAGE DISPOSAL PLANT
water
ARNOLD STATE RECREATION AREA
ARNOLD CEMETERY
Sand Creek
19
20
21
22
23
26
27
28
29
30
31
32
33
34
35
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000

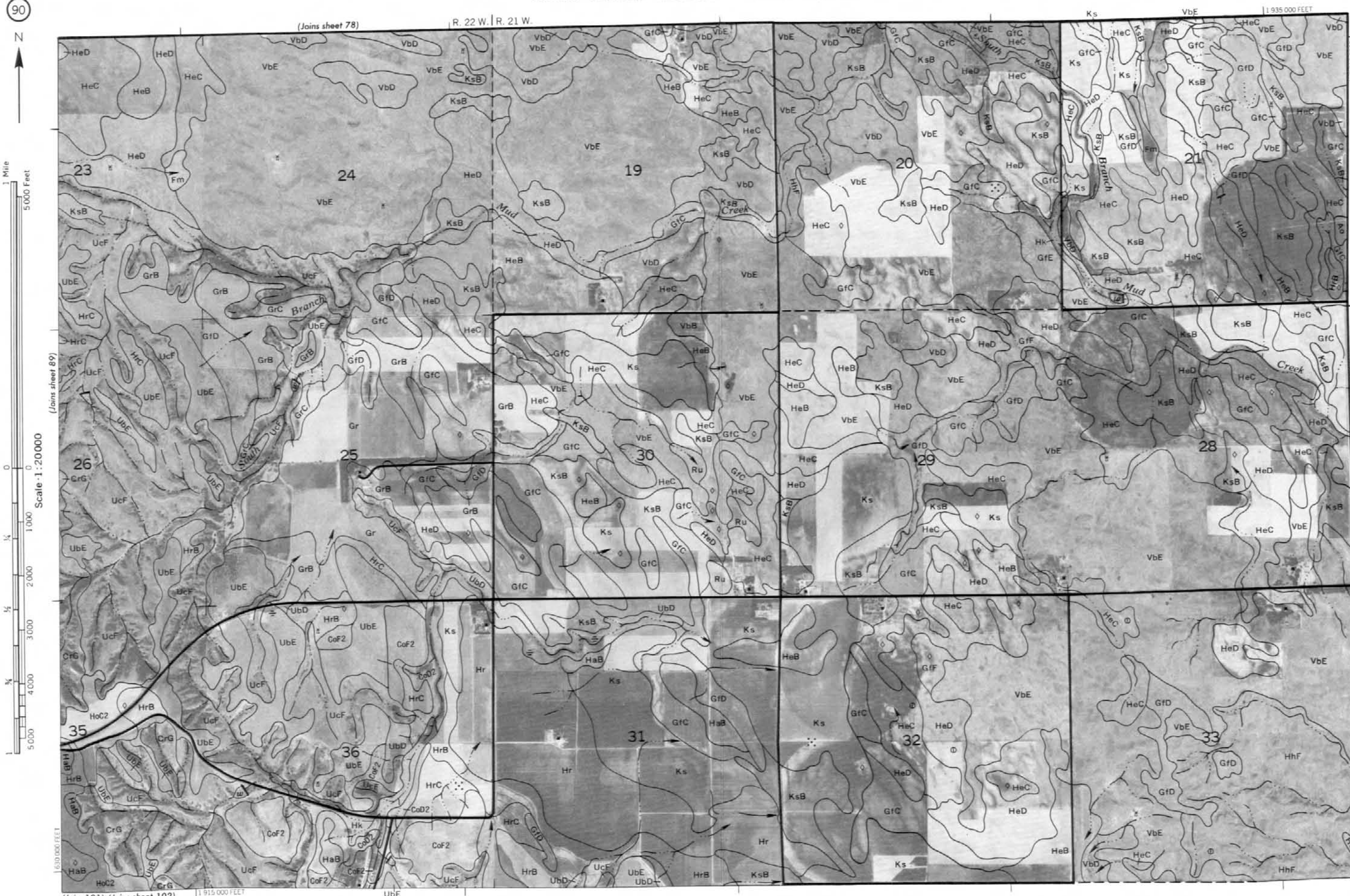
CUSTER COUNTY, NEBRASKA — SHEET NUMBER 86



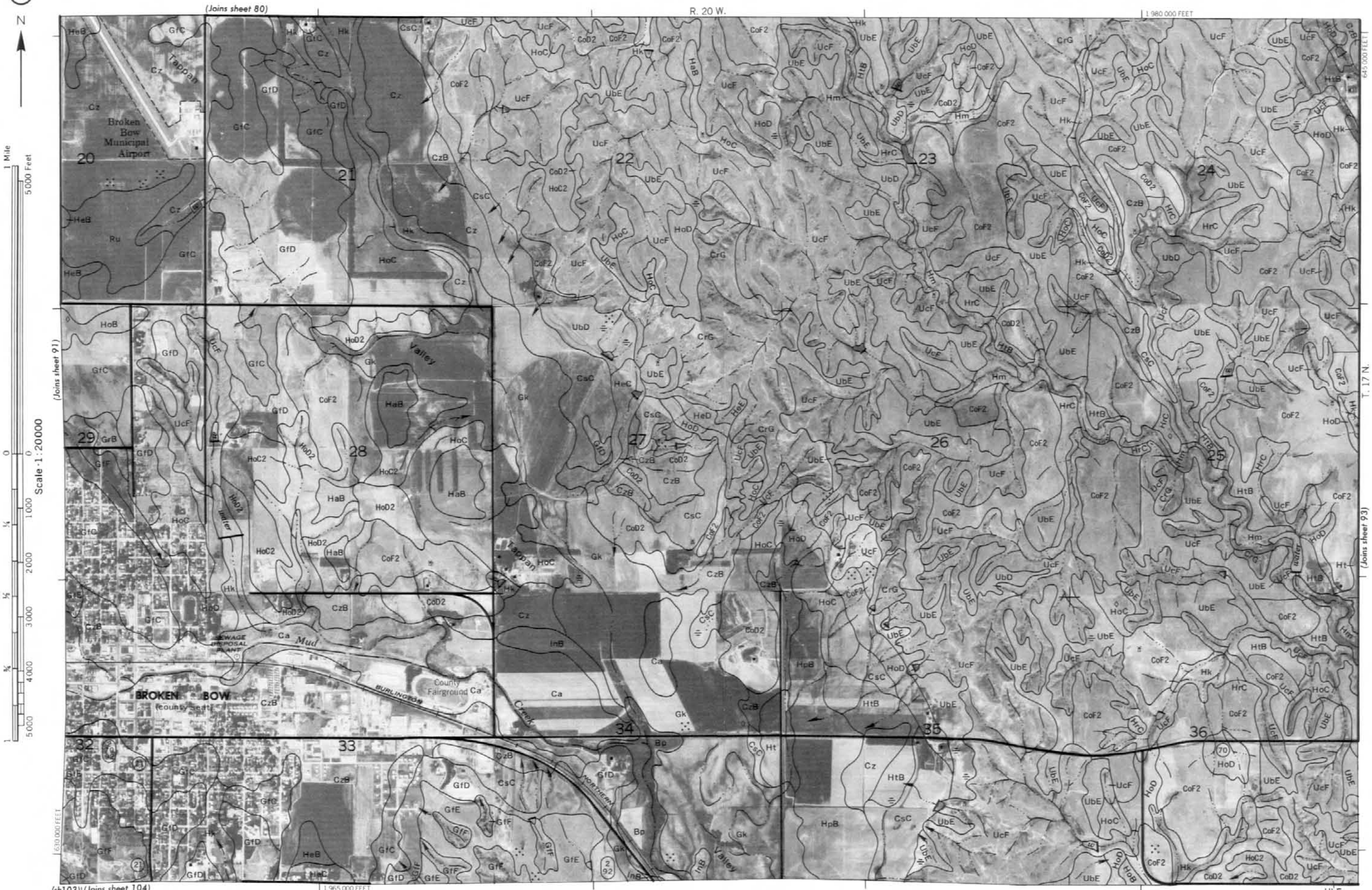

87
N
(Joins sheet 75)
R. 24 W. | R. 23 W.
1 845 000 FEET
645 000 FEET
T. 17 N.
(Joins sheet 86)
(Joins sheet 88)
(Joins sheet 98)
(Joins sheet 99)
630 000 FEET
1 865 000 FEET
Valley
Hidden
Lower
Powell
Canyon
Pine
Canyon
19
20
22
23
24
25
26
27
29
30
31
32
34
35
36
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
¼
½
¾

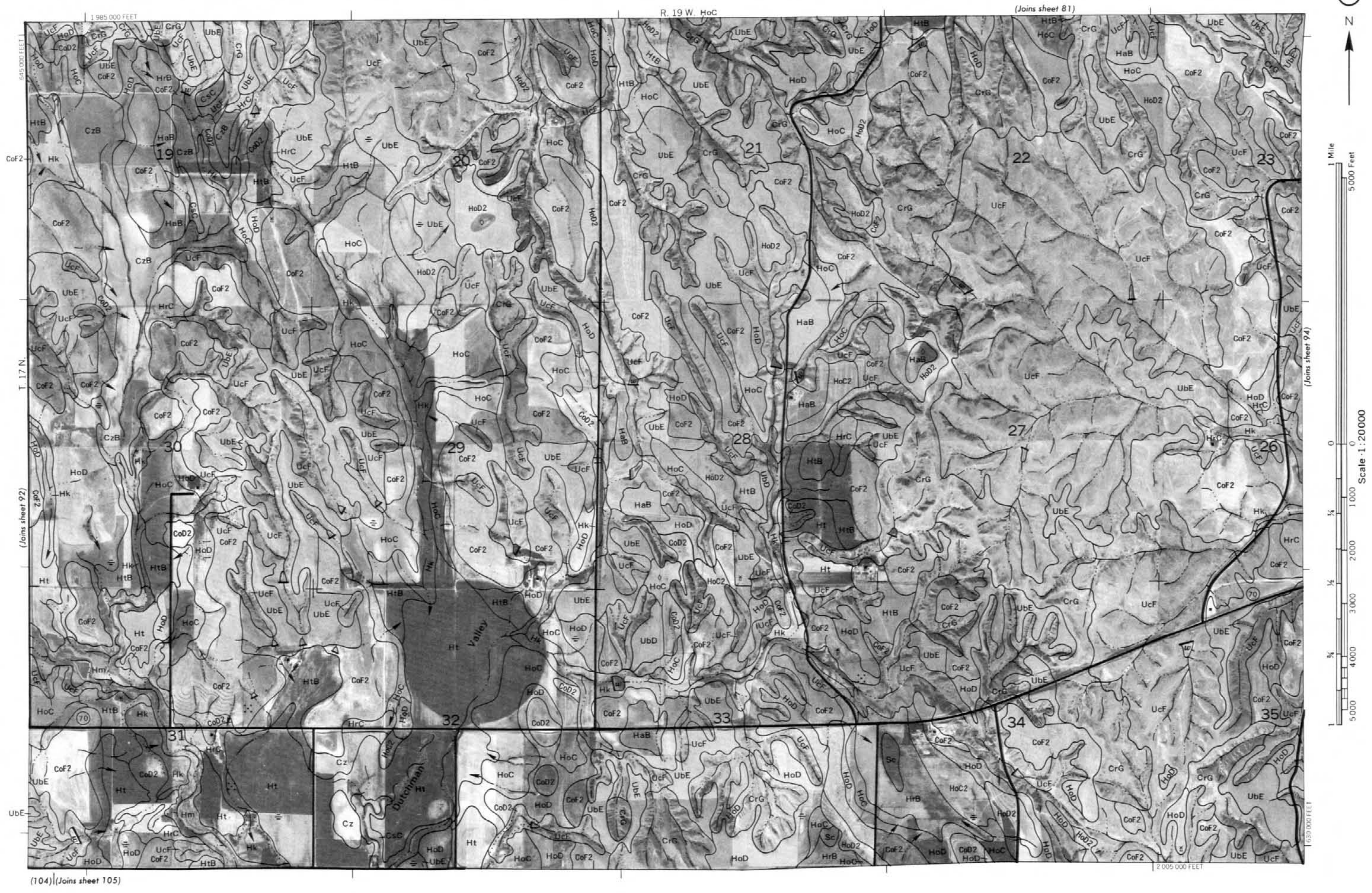

N
(Joins sheet 76)
R. 23 W.
1 885 000 FEET
645 000 FEET
(Joins sheet 87)
(Joins sheet 89)
T. 17 N.
630 000 FEET
1 870 000 FEET
(Joins 99)
(Joins sheet 100)
1 Mile
5000 Feet
Scale 1:20000
20
21
22
23
24
25
26
27
28
29
32
33
34
35
36
Spring
Creek

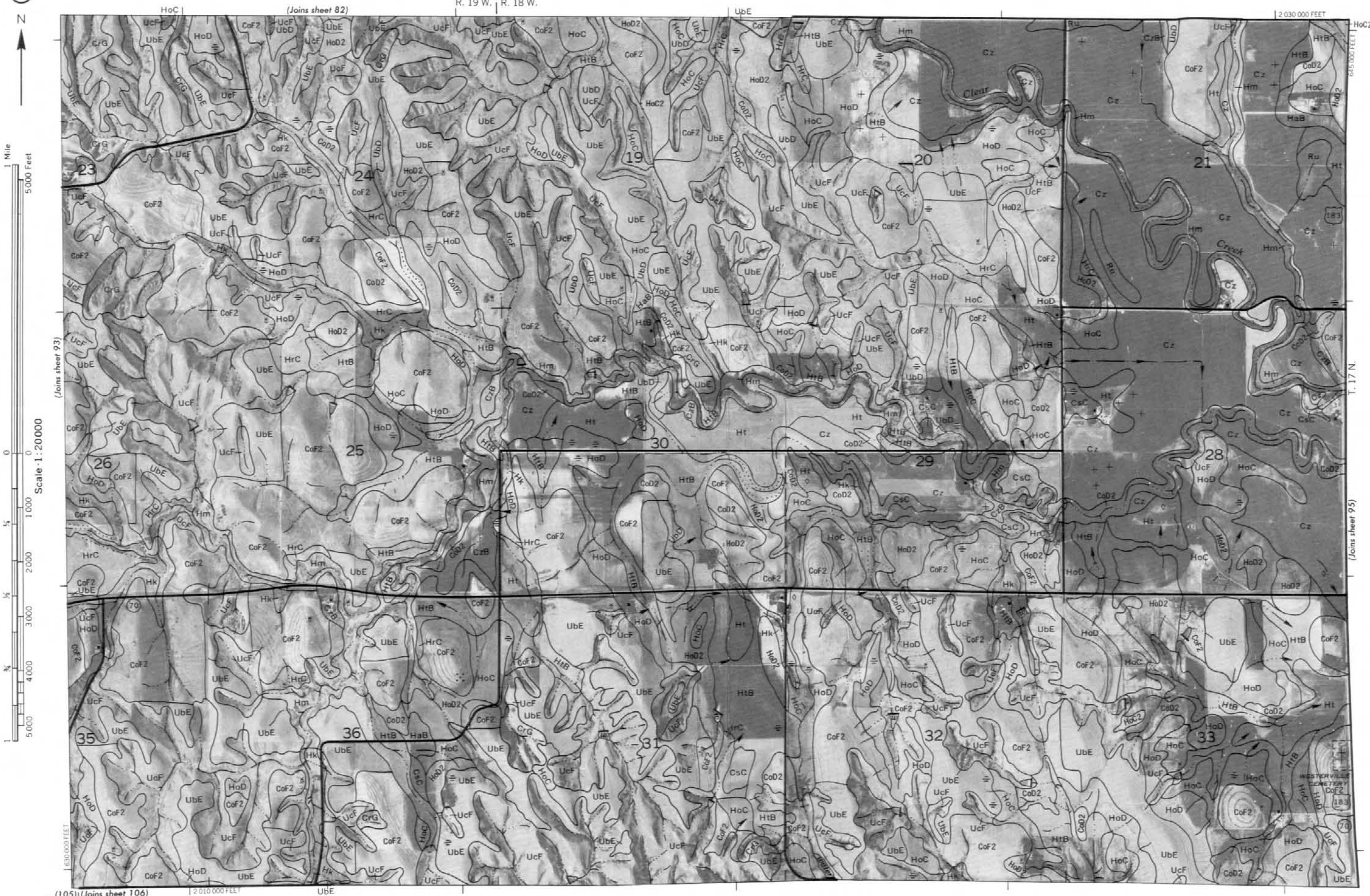

89
N
R. 22 W.
(Joins sheet 77)
(Joins sheet 88)
(Joins sheet 90)
(Joins 100)
(Joins sheet 101)
T. 17 N.
1 890 000 FEET
1 910 000 FEET
645 000 FEET
630 000 FEET
WEST TABLE
Spring Creek
19
20
21
22
23
26
27
28
29
30
31
32
33
34
35
1 Mile
5000 Feet
Scale 1:20000

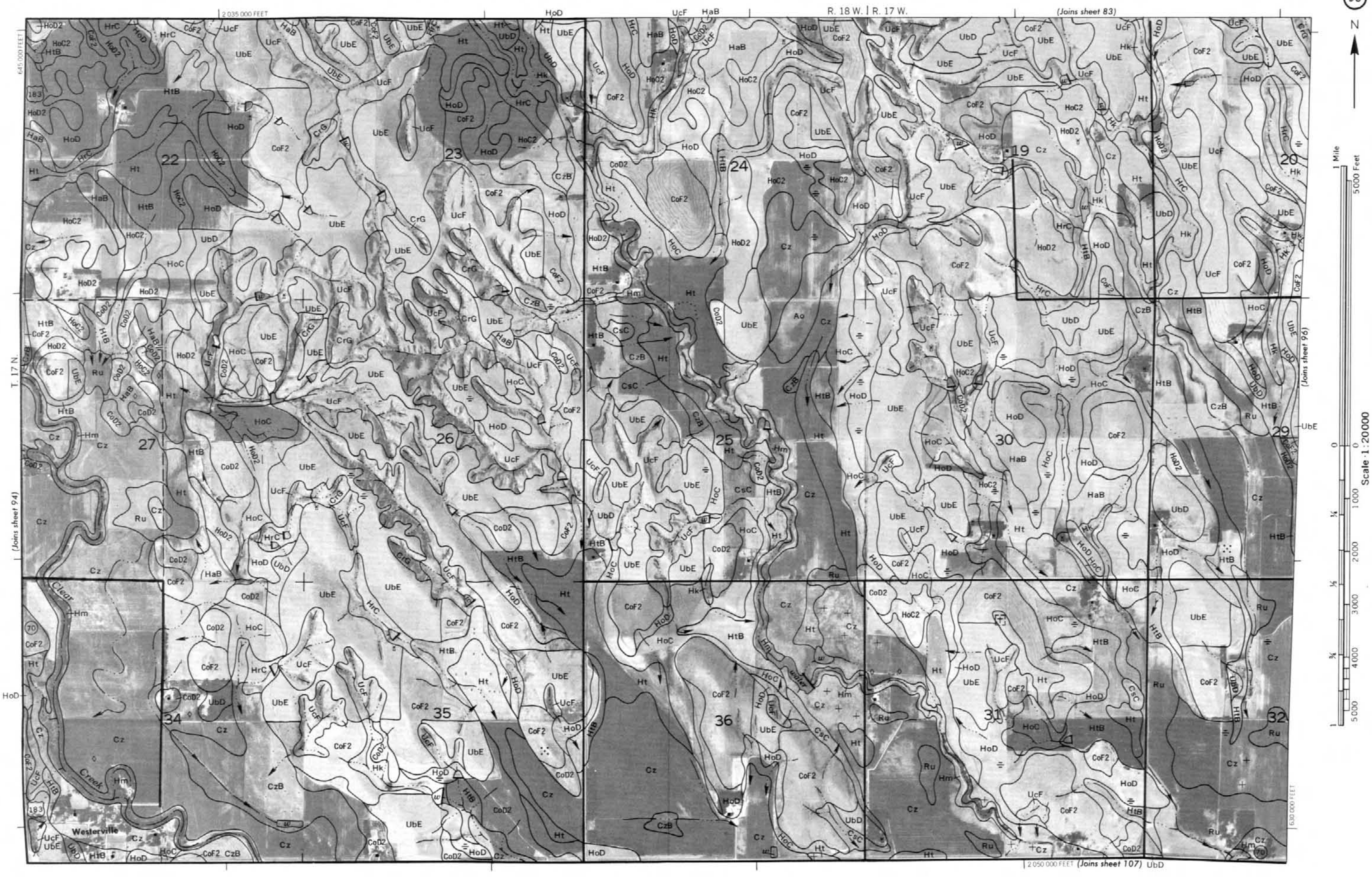

N
(Joins sheet 78)
R. 22 W. | R. 21 W.
1 935 000 FEET
645 000 FEET
(Joins sheet 89)
(Joins sheet 91)
T. 17 N.
630 000 FEET
1 915 000 FEET
(Joins 101)
(Joins sheet 102)
1 Mile
5000 Feet
Scale 1:20000
23
24
19
20
21
26
25
30
29
28
35
36
31
32
33
Mud Creek
Mud
South Branch
Branch
Creek
VbE
VbD
HeD
HeC
HeB
KsB
Ks
GfC
GfD
GrB
Gr
UcF
UbE
UbD
HrC
HrB
Hr
CrG
CoF2
CoD2
HoC2
HaB
Hk
HhF
Fm
Ru
GfE
GfF

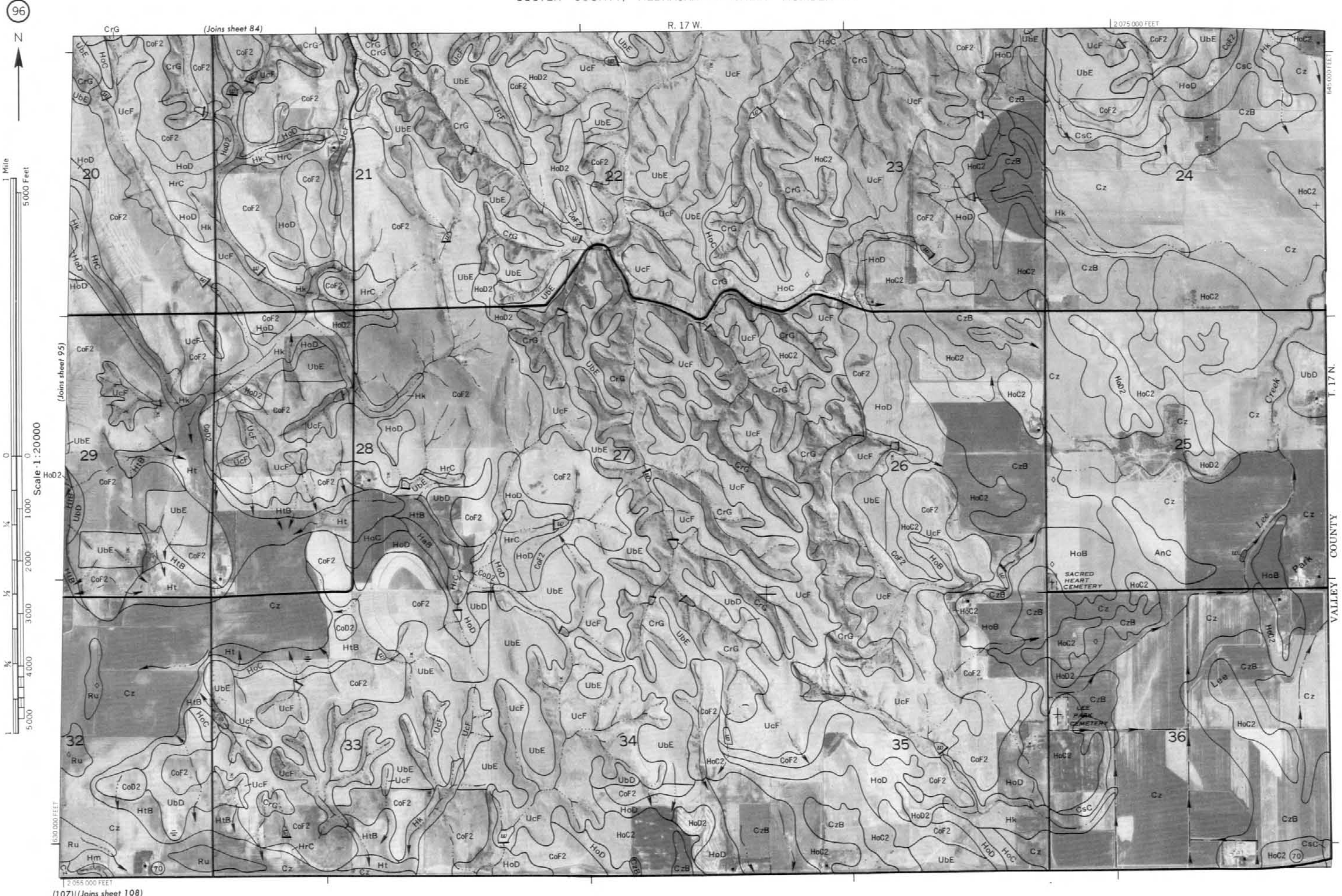

R. 21 W. | R. 20 W.
(Joins sheet 79)
(Joins sheet 92)
(Joins sheet 90)
(sh 102) (Joins sheet 103)
T. 17 N.
1 940 000 FEET
1 960 000 FEET
645 000 FEET
630 000 FEET
N
BURLINGTON NORTHERN
North Branch
Mud Creek
Mud Branch
South Branch
Tappan Valley
BROKEN BOW (county seat)
Radio Tower
SAINT JOSEPH CEMETERY
SANITARY LANDFILL
19
20
22
23
24
25
26
27
29
30
31
32
34
35
36
1 Mile
5000 Feet
Scale 1:20000

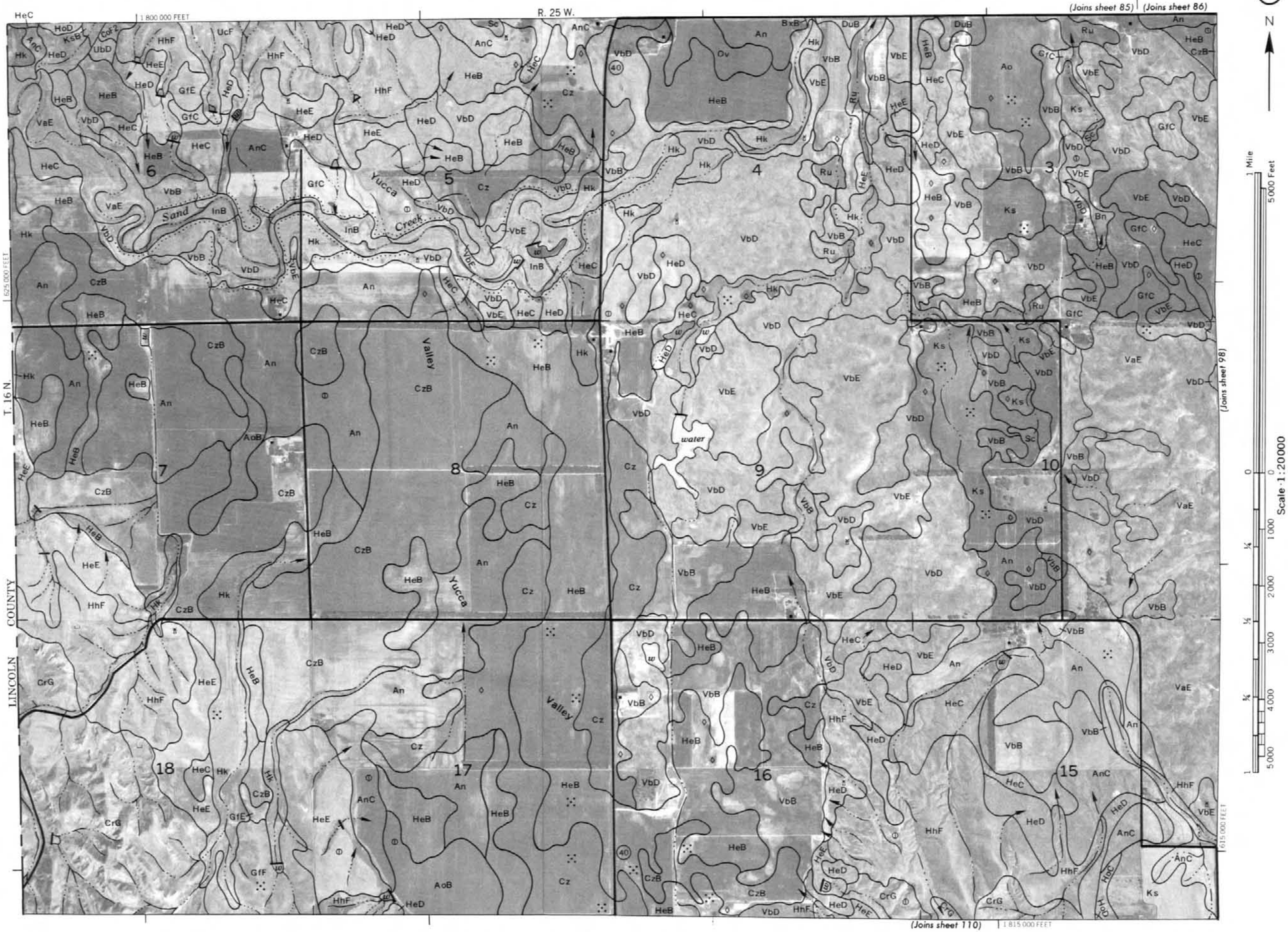

92
N
(Joins sheet 80)
R. 20 W.
1 980 000 FEET
645 000 FEET
(Joins sheet 91)
(Joins sheet 93)
T. 17 N.
(sh103)
(Joins sheet 104)
1 965 000 FEET
630 000 FEET
1 Mile
5000 Feet
Scale 1:20000
Broken Bow Municipal Airport
Tappan
Valley
Mud
Creek
SEWAGE DISPOSAL PLANT
County Fairground
BURLINGTON
NORTHERN
BROKEN BOW
(county seat)
20
21
22
23
24
25
26
27
28
29
32
33
34
35
36


93
N
R. 19 W.
(Joins sheet 81)
(Joins sheet 92)
(Joins sheet 94)
(104) (Joins sheet 105)
T. 17 N.
1 985 000 FEET
645 000 FEET
2 005 000 FEET
630 000 FEET
1 Mile
5000 Feet
Scale 1:20000
Valley
Dutchman

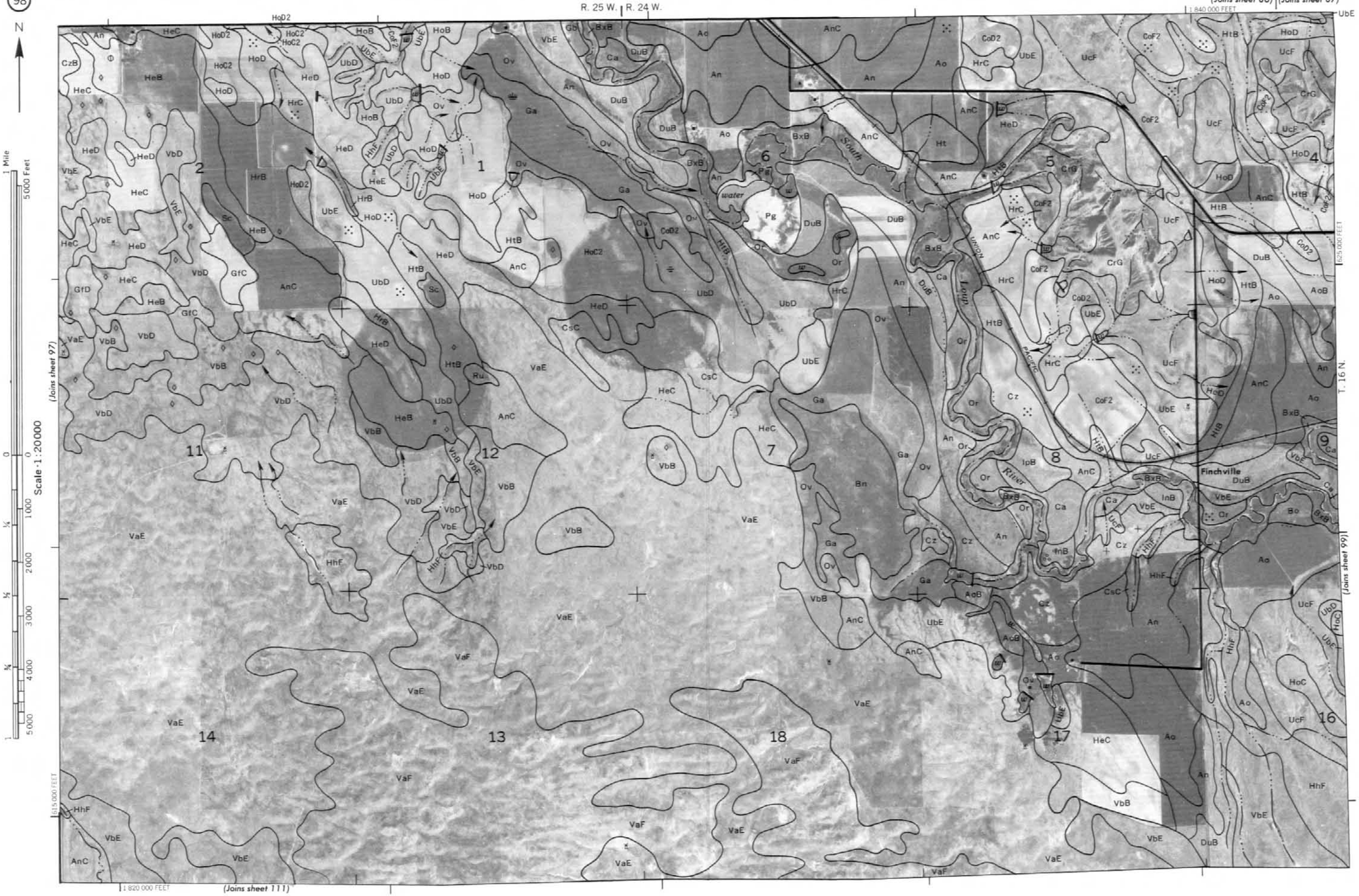

N
(Joins sheet 82)
R. 19 W.
R. 18 W.
2 030 000 FEET
645 000 FEET
T. 17 N.
(Joins sheet 93)
(Joins sheet 95)
(105) (Joins sheet 106)
2 010 000 FEET
630 000 FEET
1 Mile
5000 Feet
Scale 1:20000
Clear Creek
Westerville Cemetery
19
20
21
23
24
25
26
28
29
30
31
32
33
35
36


95
N
R. 18 W. | R. 17 W.
(Joins sheet 83)
(Joins sheet 94)
(Joins sheet 96)
(Joins sheet 107)
T. 17 N.
2 035 000 FEET
2 050 000 FEET
645 000 FEET
Westerville
Clear Creek
22
23
24
19
20
27
26
25
30
29
34
35
36
31
32
1 Mile
5000 Feet
Scale 1:20000


96
N
(Joins sheet 84)
R. 17 W.
2 075 000 FEET
645 000 FEET
(Joins sheet 95)
T. 17 N.
VALLEY COUNTY
1 Mile
5000 Feet
Scale 1:20000
SACRED HEART CEMETERY
LEE PARK CEMETERY
Lee Park Creek
630 000 FEET
2 055 000 FEET
(107)
(Joins sheet 108)
20
21
22
23
24
25
26
27
28
29
32
33
34
35
36
70

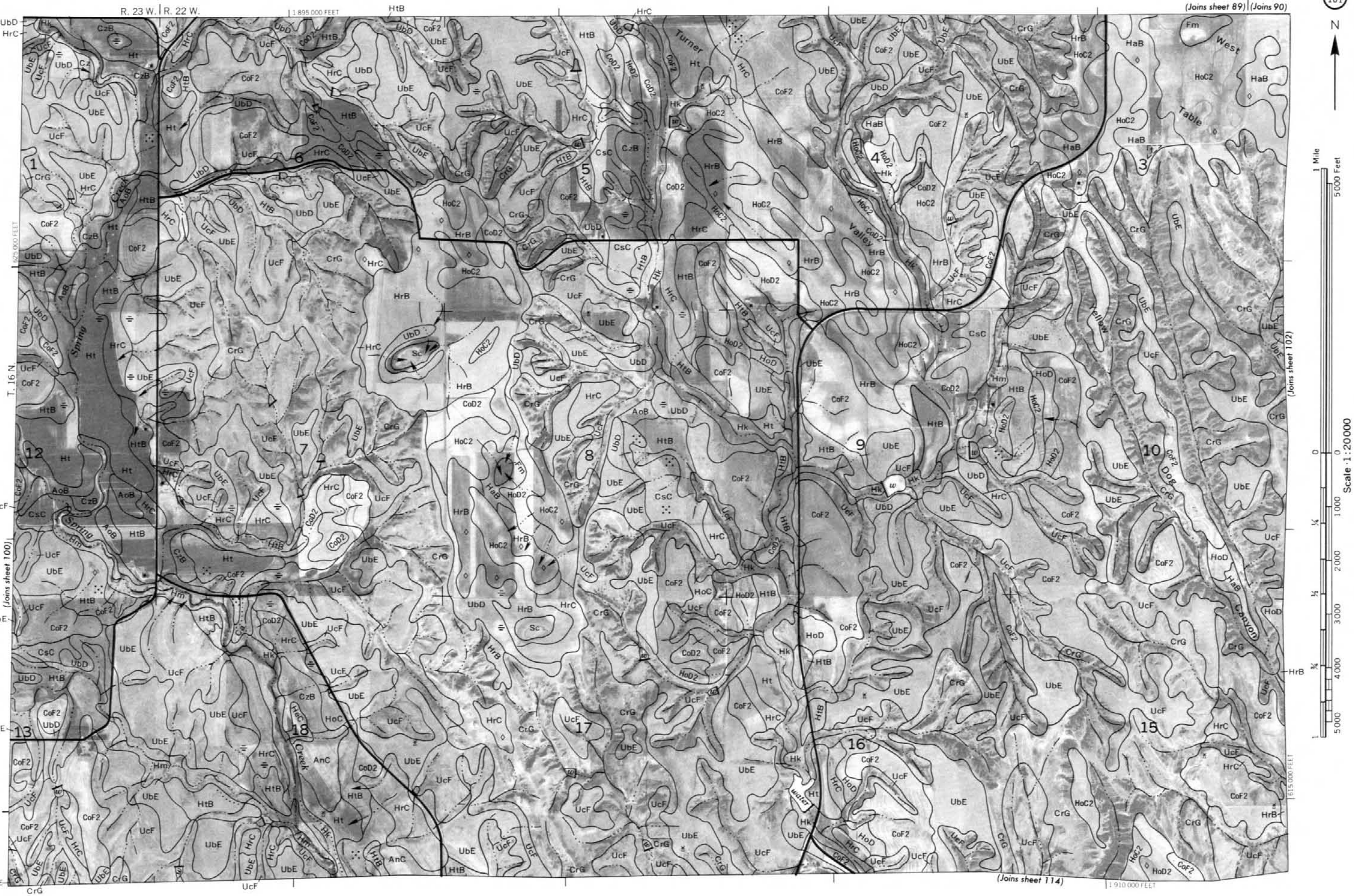

97
N
R. 25 W.
1 800 000 FEET
(Joins sheet 85)
(Joins sheet 86)
(Joins sheet 98)
(Joins sheet 110)
1 815 000 FEET
625 000 FEET
615 000 FEET
T. 16 N.
LINCOLN COUNTY
Sand Creek
Yucca Creek
Yucca Valley
Valley
water
40
1 Mile
5000 Feet
Scale 1:20000
6
5
4
3
7
8
9
10
18
17
16
15

CUSTER COUNTY, NEBRASKA — SHEET NUMBER 98



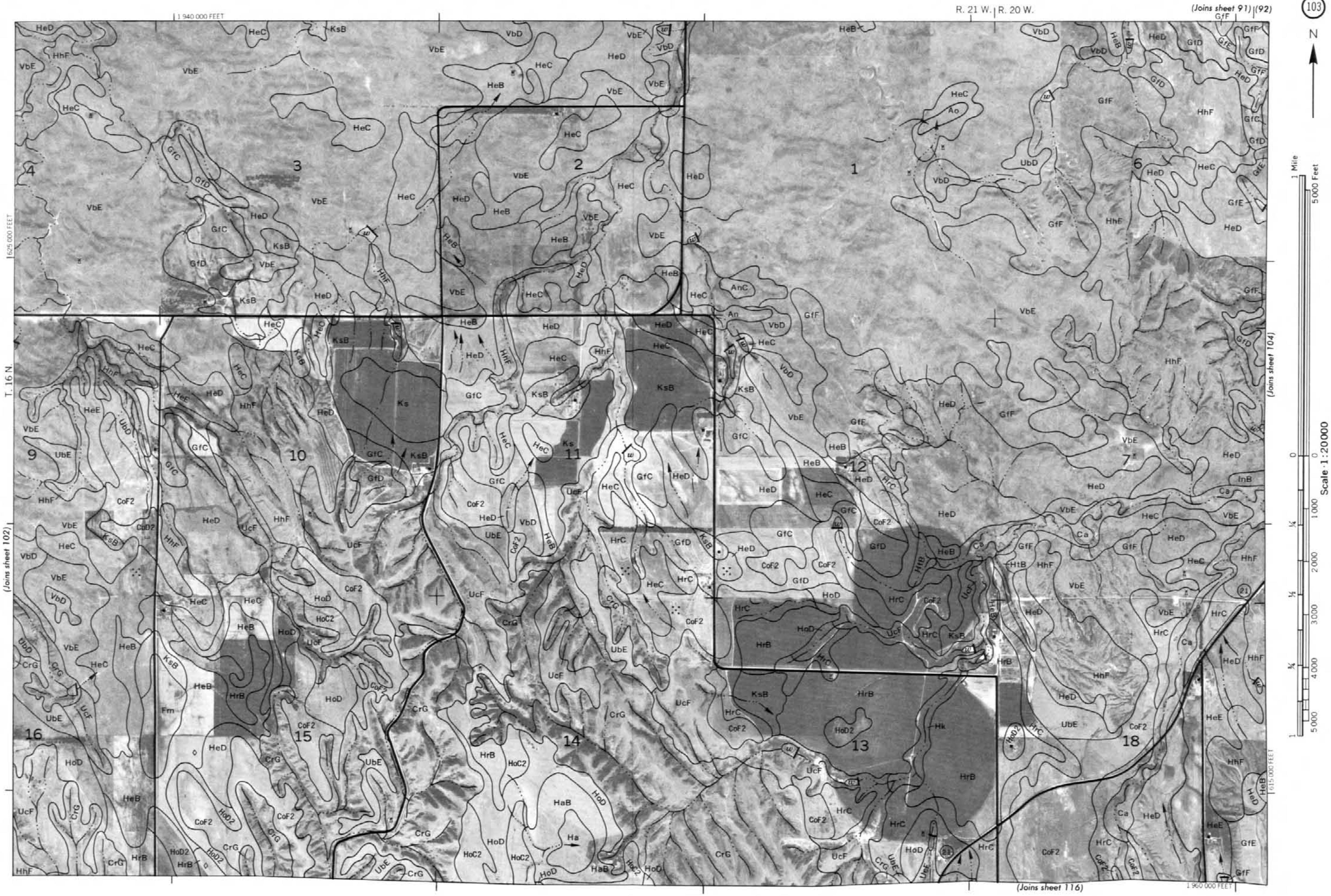

99
(Joins sheet 87)
(Joins 88)
R. 24 W.
R. 23 W.
1 845 000 FEET
625 000 FEET
T. 16 N.
(Joins sheet 98)
(Joins sheet 100)
(Joins sheet 112)
1 865 000 FEET
615 000 FEET
WILHELM CEMETERY
Loup River
South Loup River
UNION PACIFIC
Milldale
N
1 Mile
5000 Feet
Scale 1:20000

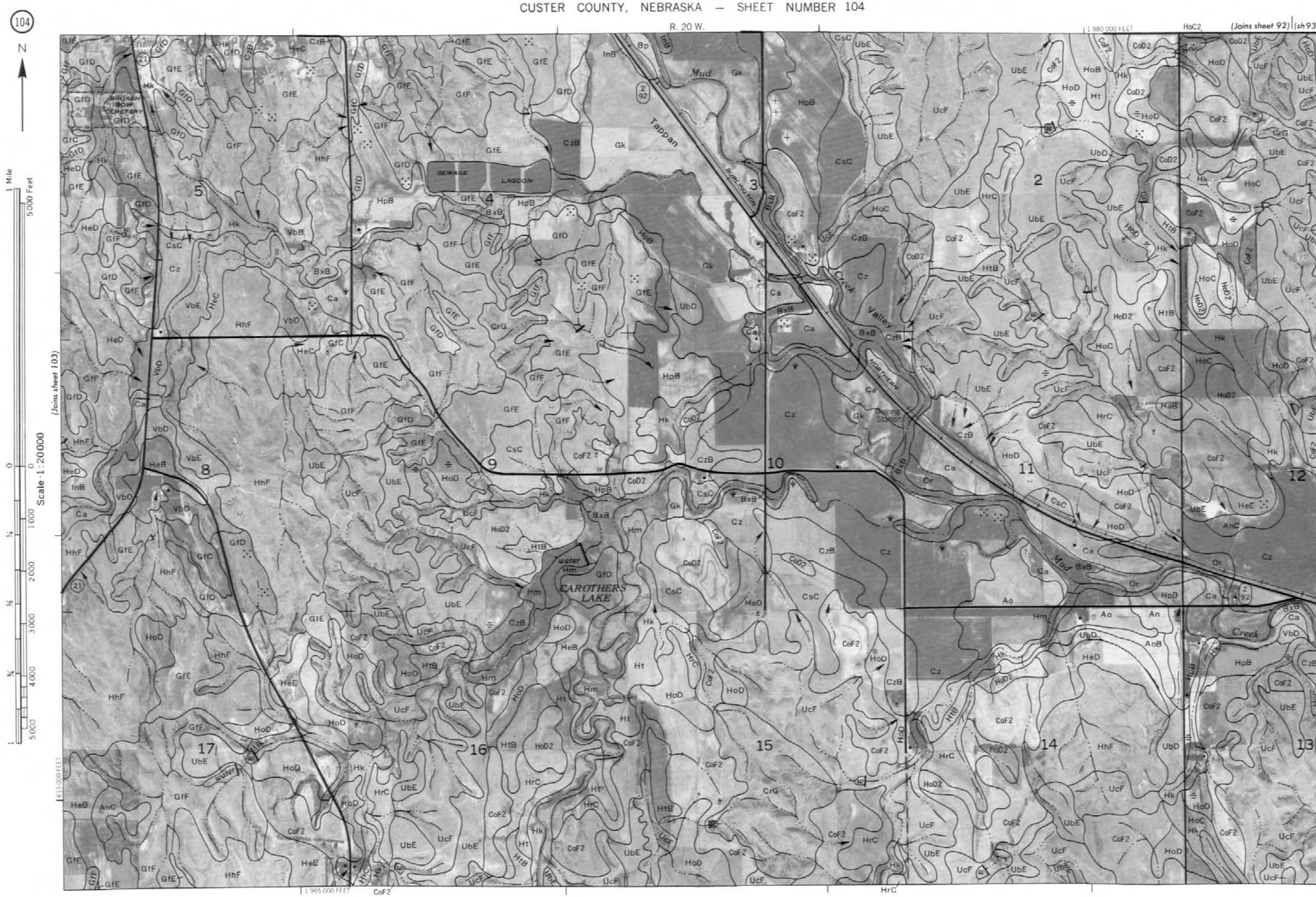

100
N
R. 23 W.
T. 16 N.
1 885 000 FEET
1 870 000 FEET
625 000 FEET
615 000 FEET
(Joins sheet 88)
(Joins sheet 89)
(Joins sheet 99)
(Joins sheet 101)
(Joins sheet 113)
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
¼
½
¾
1
2
3
4
5
8
9
10
11
12
13
14
15
16
17


101
N
R. 23 W.
R. 22 W.
1 895 000 FEET
(Joins sheet 89)
(Joins 90)
(Joins sheet 100)
(Joins sheet 102)
(Joins sheet 114)
1 910 000 FEET
625 000 FEET
615 000 FEET
T. 16 N.
1 Mile
5000 Feet
Scale 1:20000
Turner
Valley
Spring
Creek
West
Table
Yellow
Dog
Canyon
water
1
3
4
5
6
7
8
9
10
12
13
15
16
17
18

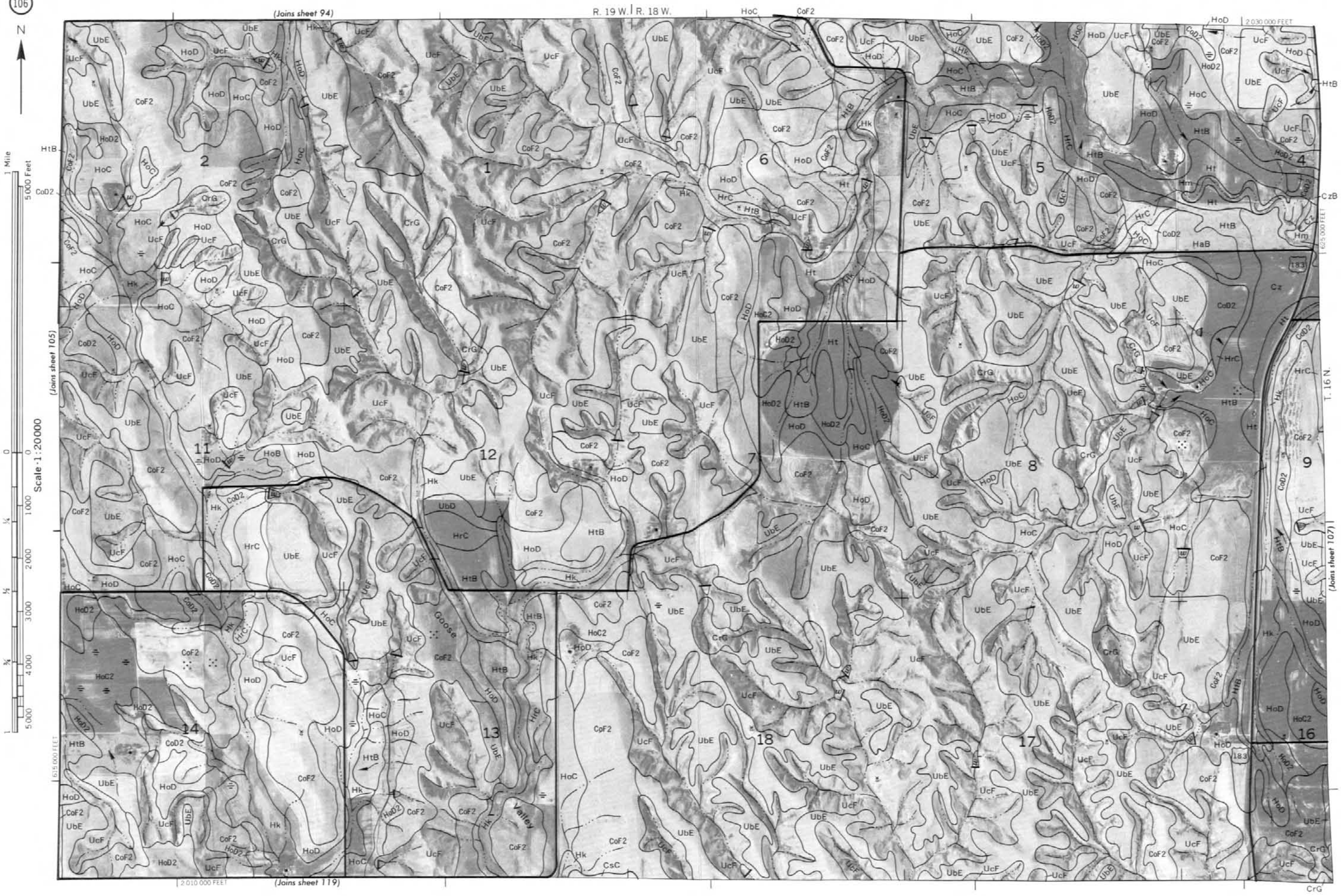
102

CUSTER COUNTY, NEBRASKA — SHEET NUMBER 102


103
N
(Joins sheet 91)
(92)
R. 21 W.
R. 20 W.
1 940 000 FEET
625 000 FEET
615 000 FEET
1 960 000 FEET
T. 16 N.
(Joins sheet 104)
(Joins sheet 102)
(Joins sheet 116)
1 Mile
5000 Feet
Scale 1:20000
1
2
3
4
6
7
9
10
11
12
13
14
15
16
18

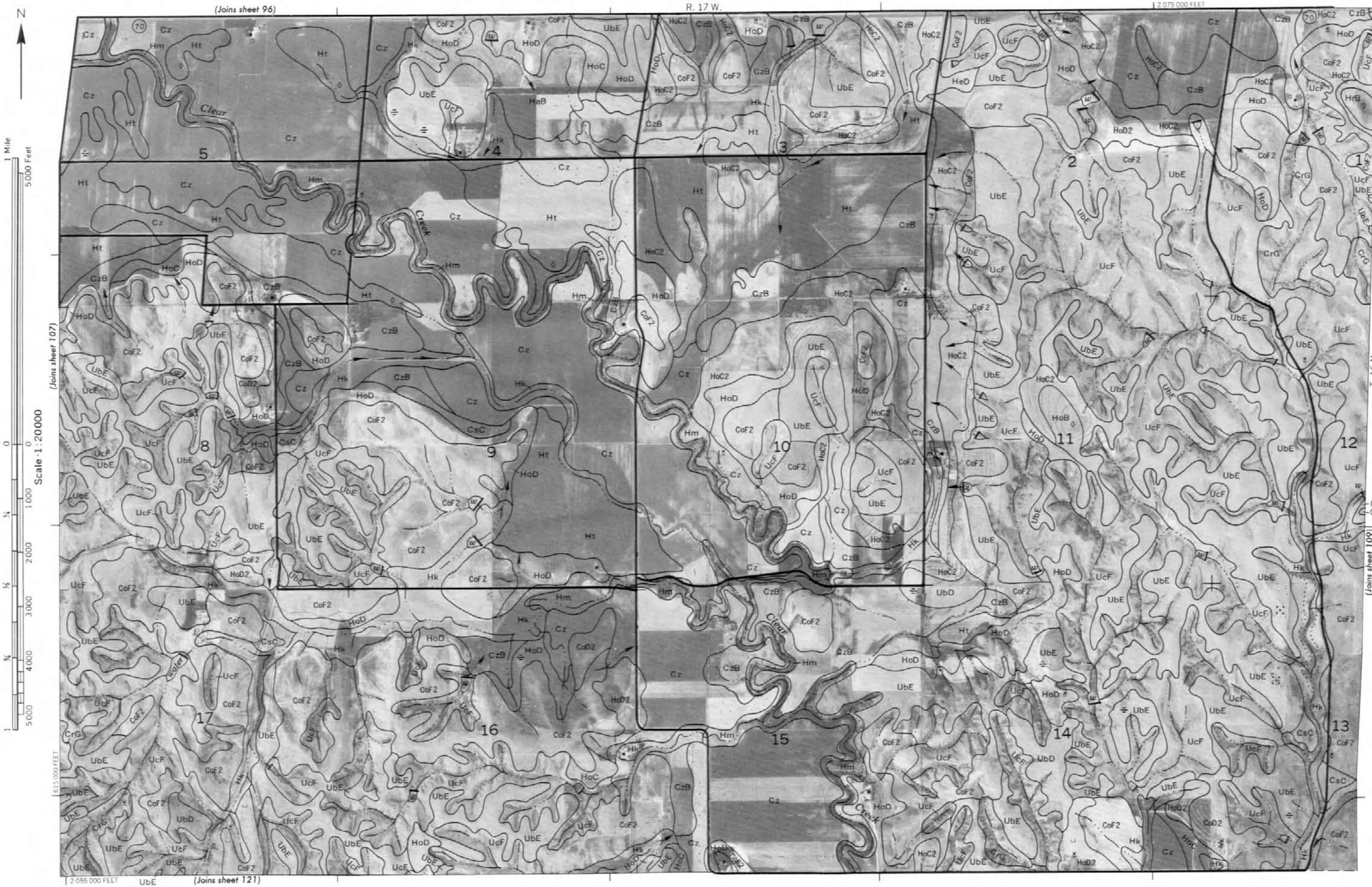

104
N
1 Mile
5000 Feet
Scale 1:20000
R. 20 W.
T. 16 N.
(Joins sheet 92)
(sh 93)
(Joins sheet 103)
(Joins sheet 105)
1 980 000 FEET
625 000 FEET
615 000 FEET
1 965 000 FEET
BROKEN BOW CEMETERY
SEWAGE LAGOON
CAROTHERS LAKE
Mud
Tappan
Creek
Valley
Mud Creek
BURLINGTON NORTHERN
Pumping Station
water
1
2
3
4
5
8
9
10
11
12
13
14
15
16
17

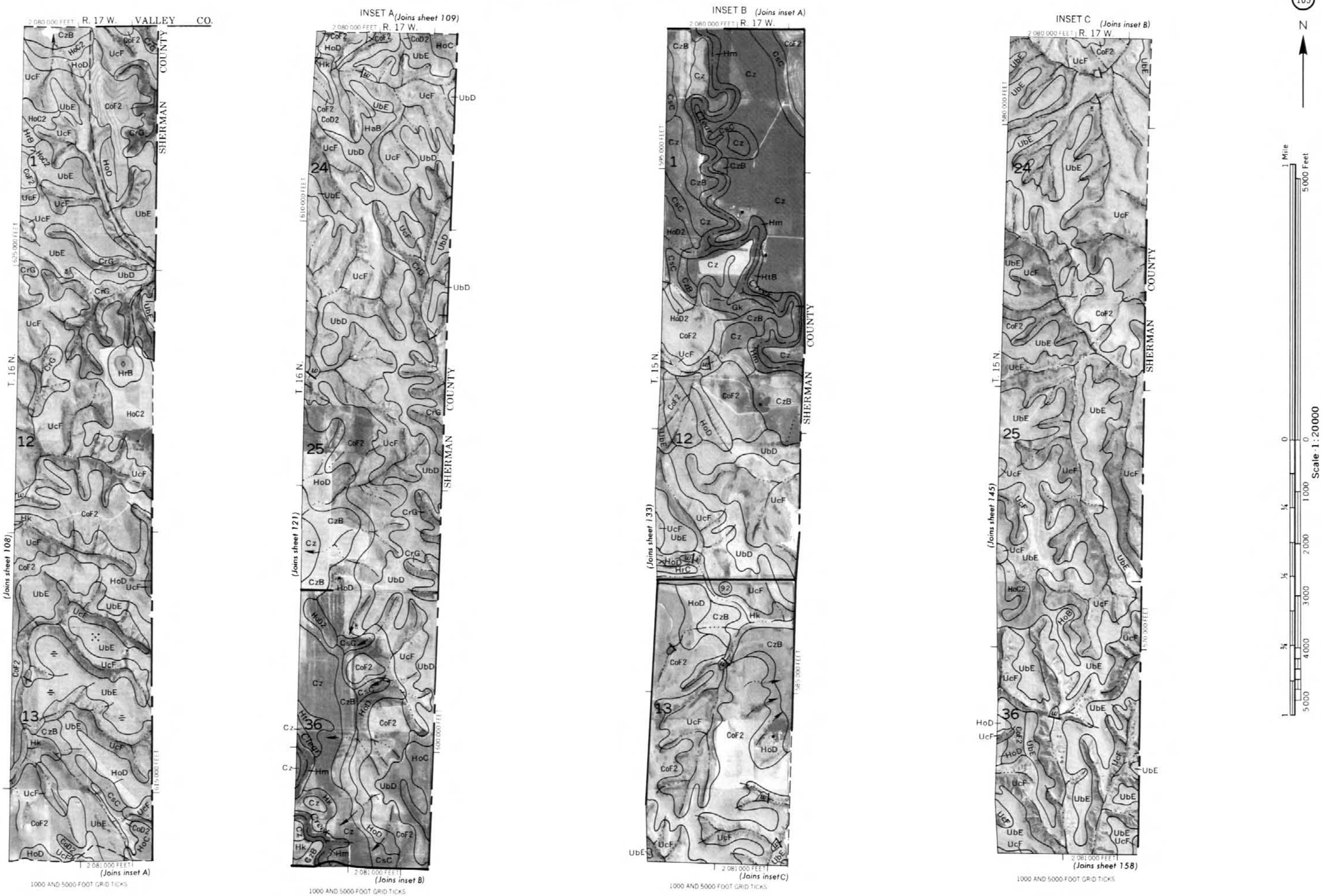

105
N
(Joins sheet 93)
(94)
1 985 000 FEET
R. 20 W.
R. 19 W.
625 000 FEET
T. 16 N.
(Joins sheet 104)
(Joins sheet 106)
(Joins sheet 118)
2 005 000 FEET
615 000 FEET
Dutchman
Valley
Mud
Creek
BURLINGTON
NORTHERN
Berwyn
1 Mile
5000 Feet
0
1000
2000
3000
4000
5000
Scale 1:20000
¼
½
¾
1
2
3
4
5
6
7
8
9
10
12
13
15
16
17
18


106
N
(Joins sheet 94)
R. 19 W. | R. 18 W.
2 030 000 FEET
625 000 FEET
615 000 FEET
2 010 000 FEET
(Joins sheet 105)
(Joins sheet 107)
(Joins sheet 119)
T. 16 N.
1 Mile
5000 Feet
Scale 1:20 000
Goose
Valley
183
1
2
4
5
6
7
8
9
11
12
13
14
16
17
18

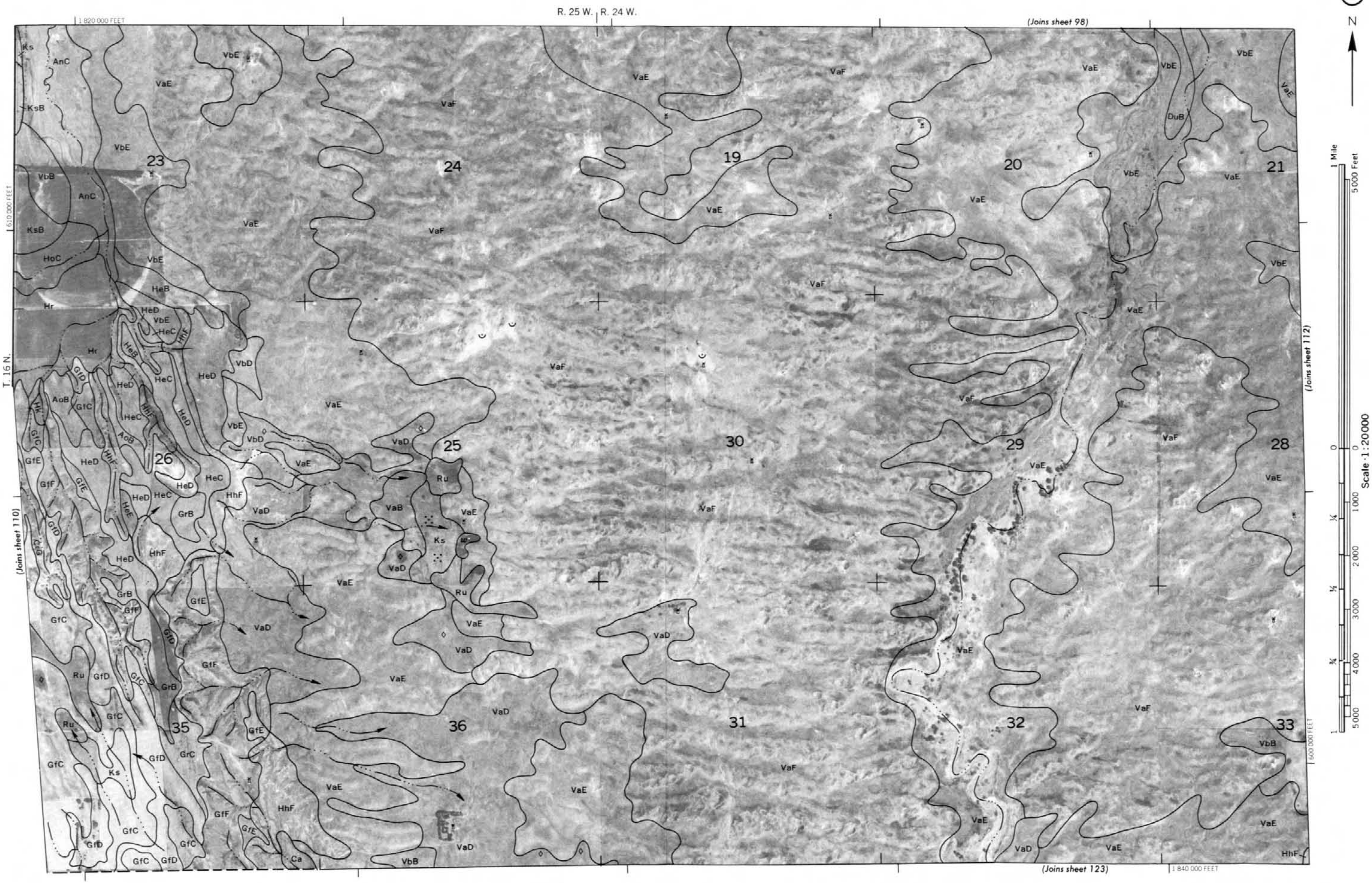
107
N
R. 18 W.
R. 17 W.
(Joins sheet 95)
(96)
2 035 000 FEET
625 000 FEET
T. 16 N.
(Joins sheet 106)
(Joins sheet 108)
615 000 FEET
2 050 000 FEET
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
Clear
Creek
Moody
Valley
183
70
1
2
3
4
6
7
9
10
11
12
13
14
15
16
18

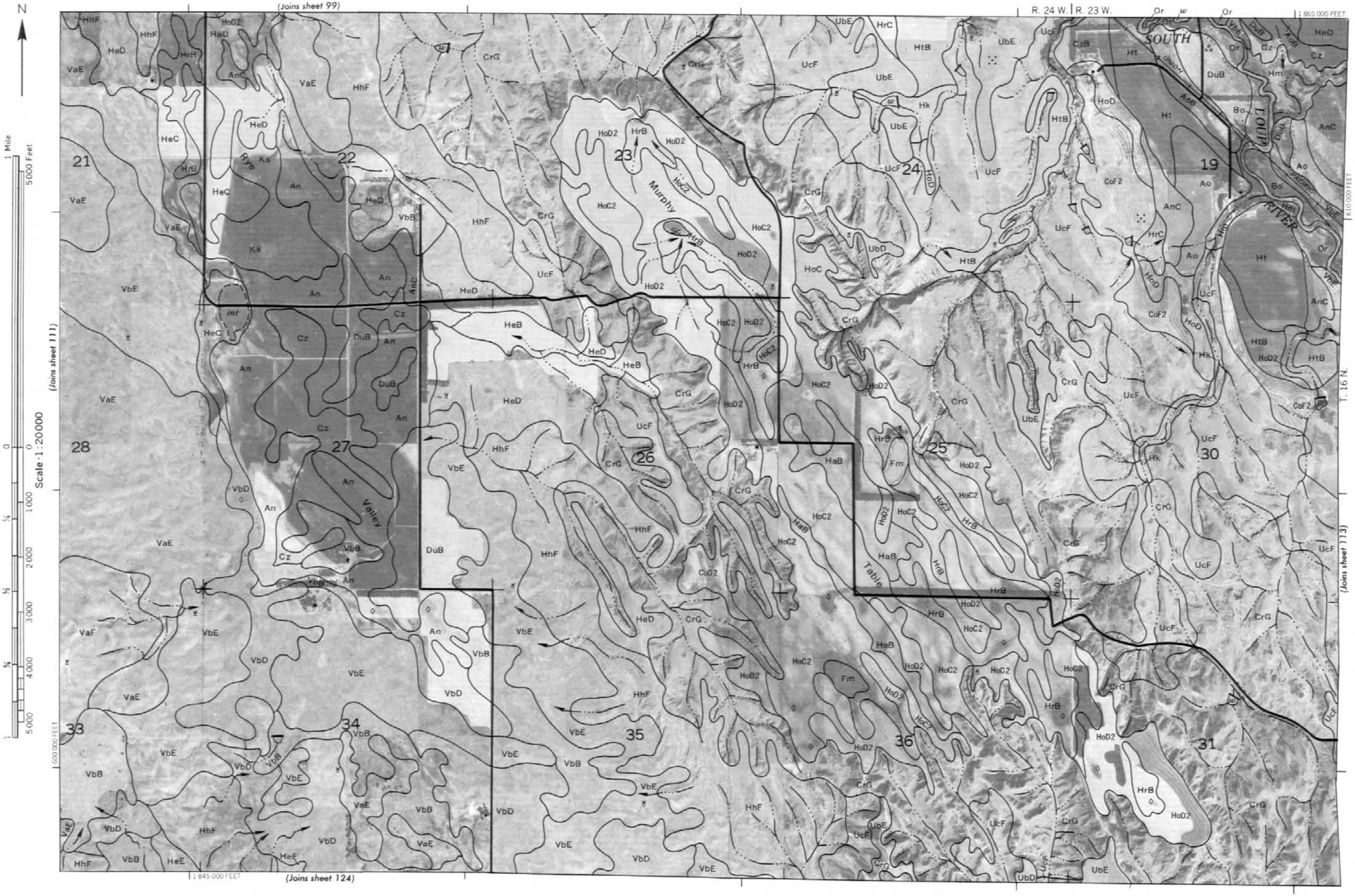
CUSTER COUNTY, NEBRASKA — SHEET NUMBER 108



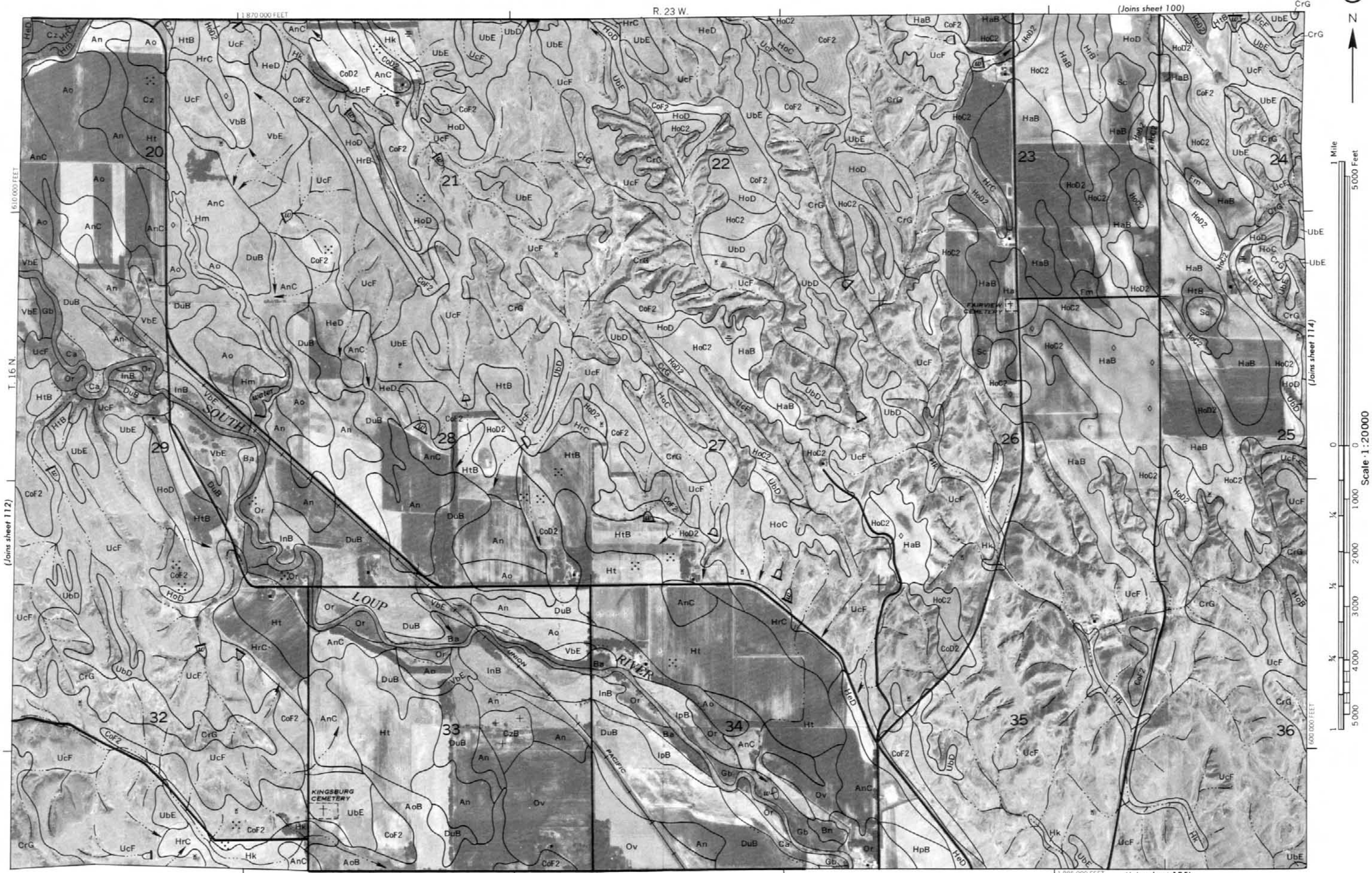

109
N
R. 17 W.
VALLEY CO.
SHERMAN COUNTY
T. 16 N.
(Joins sheet 108)
(Joins inset A)
1000 AND 5000-FOOT GRID TICKS
INSET A (Joins sheet 109)
(Joins sheet 121)
(Joins inset B)
INSET B (Joins inset A)
T. 15 N.
(Joins sheet 133)
(Joins inset C)
INSET C (Joins inset B)
(Joins sheet 145)
(Joins sheet 158)
1 Mile
5000 Feet
Scale 1:20000

CUSTER COUNTY, NEBRASKA — SHEET NUMBER 110

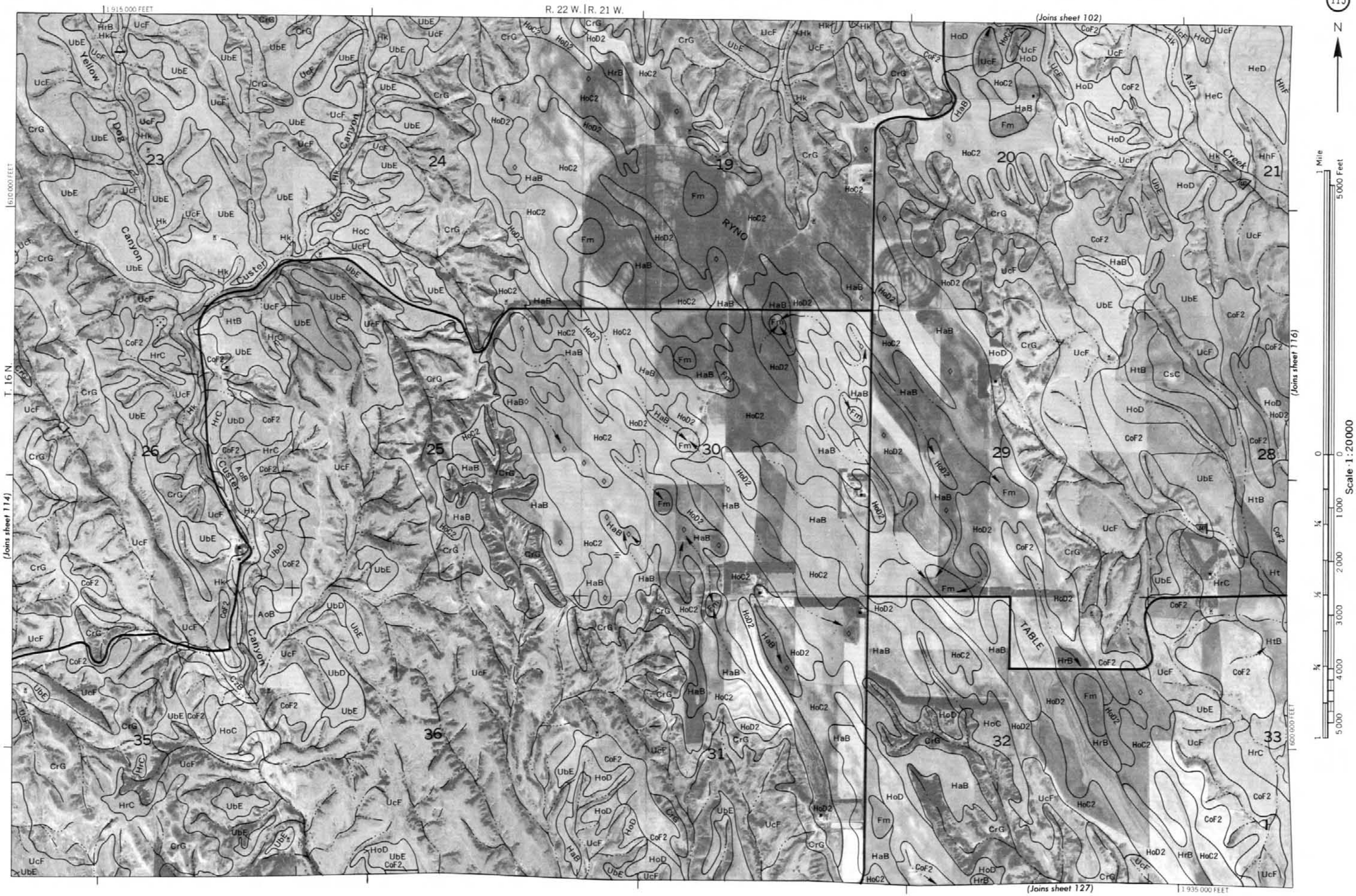

111
N
R. 25 W. R. 24 W.
(Joins sheet 98)
(Joins sheet 110)
(Joins sheet 112)
(Joins sheet 123)
T. 16 N.
1 820 000 FEET
1 840 000 FEET
610 000 FEET
600 000 FEET
19
20
21
23
24
25
26
28
29
30
31
32
33
35
36
1 Mile
5000 Feet
Scale 1:20000


N
(Joins sheet 99)
(Joins sheet 111)
(Joins sheet 113)
(Joins sheet 124)
R. 24 W. | R. 23 W.
T. 16 N.
1 865 000 FEET
610 000 FEET
1 845 000 FEET
590 000 FEET
Scale 1:20000
1 Mile
5000 Feet
SOUTH
LOUP
RIVER
UNION
PACIFIC
Rye
Murphy
Valley
Table
21
22
23
24
19
28
27
26
25
30
33
34
35
36
31

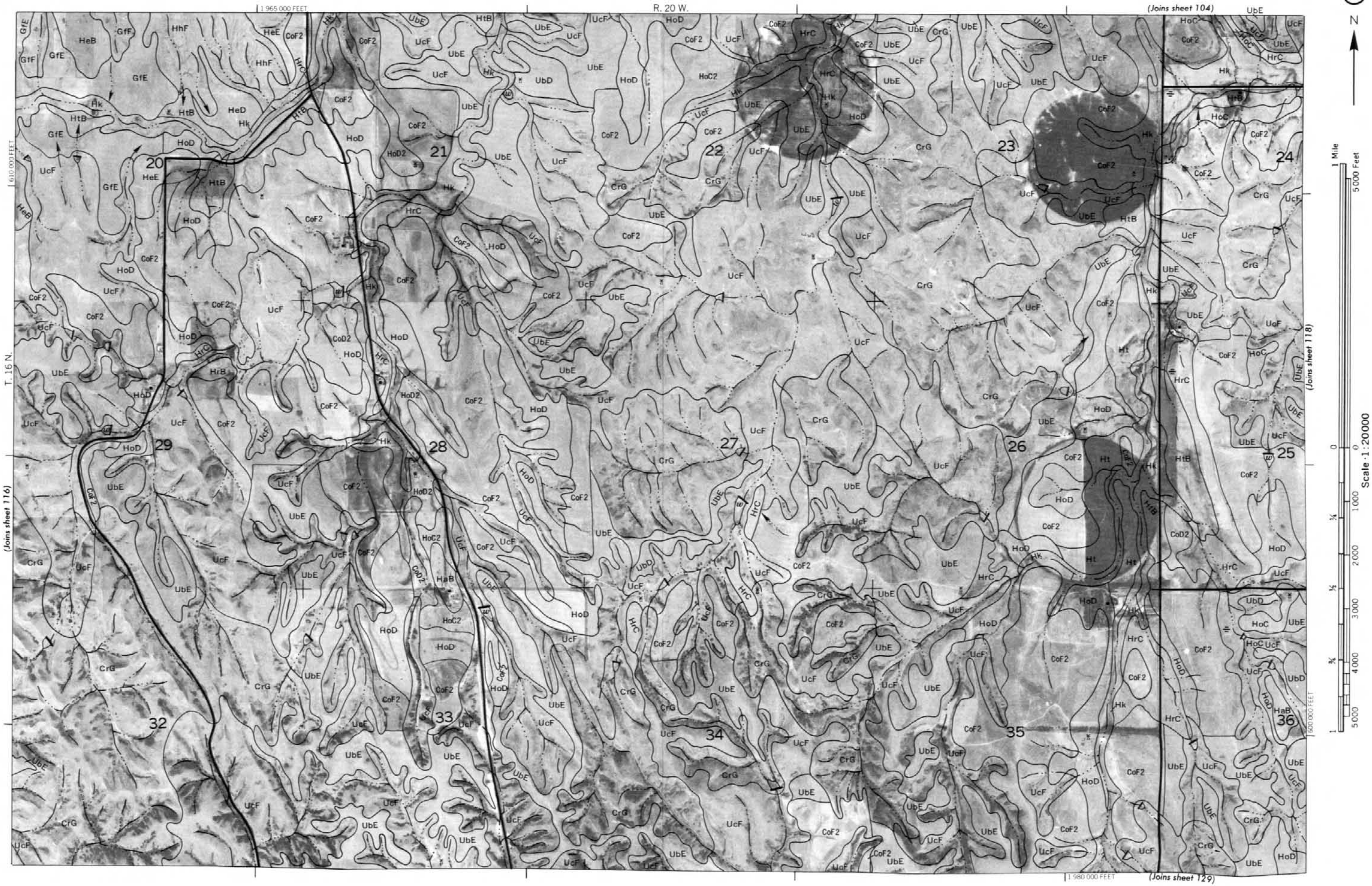
113


R. 23 W.
T. 16 N.
(Joins sheet 100)
(Joins sheet 112)
(Joins sheet 114)
(Joins sheet 125)
1 870 000 FEET
1 885 000 FEET
610 000 FEET
600 000 FEET
N
1 Mile
5000 Feet
Scale 1:20000
SOUTH
LOUP
RIVER
UNION
PACIFIC
FAIRVIEW CEMETERY
KINGSBURG CEMETERY
20
21
22
23
24
25
26
27
28
29
32
33
34
35
36

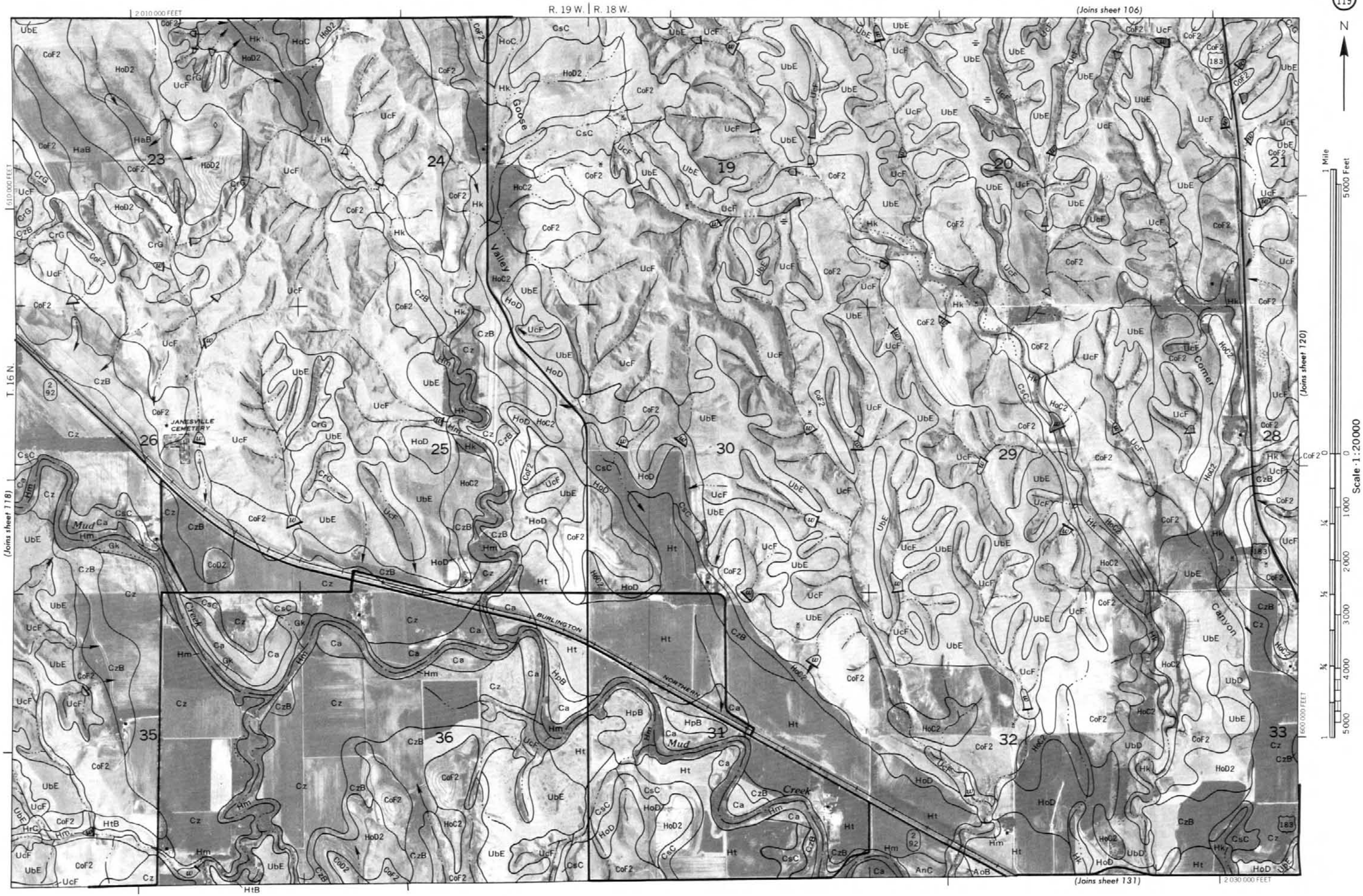

N
R. 23 W. | R. 22 W.
(Joins sheet 101)
(Joins sheet 113)
(Joins sheet 115)
(Joins sheet 126)
T. 16 N.
1 910 000 FEET
1 890 000 FEET
610 000 FEET
600 000 FEET
1 Mile
5000 Feet
Scale 1:20000
Spring
Creek
19
20
21
22
24
25
27
28
29
30
31
32
33
34
36

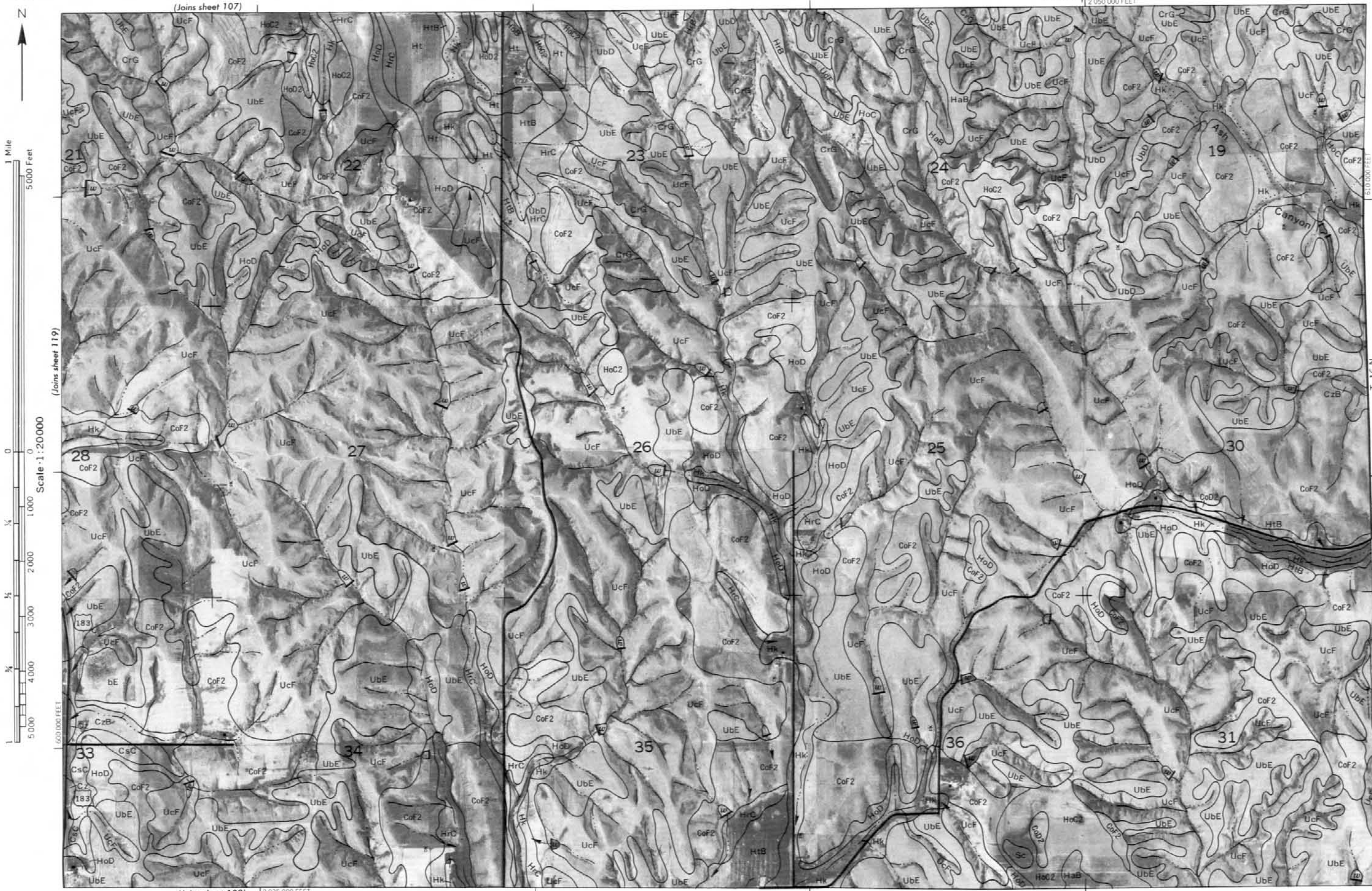

115
N
R. 22 W. | R. 21 W.
T. 16 N.
(Joins sheet 102)
(Joins sheet 114)
(Joins sheet 116)
(Joins sheet 127)
1 915 000 FEET
1 935 000 FEET
610 000 FEET
600 000 FEET
1 Mile
5000 Feet
Scale 1:20000
Yellow
Dog
Canyon
Custer
Ash
Creek
RYNO
TABLE
19
20
21
23
24
25
26
28
29
30
31
32
33
35
36

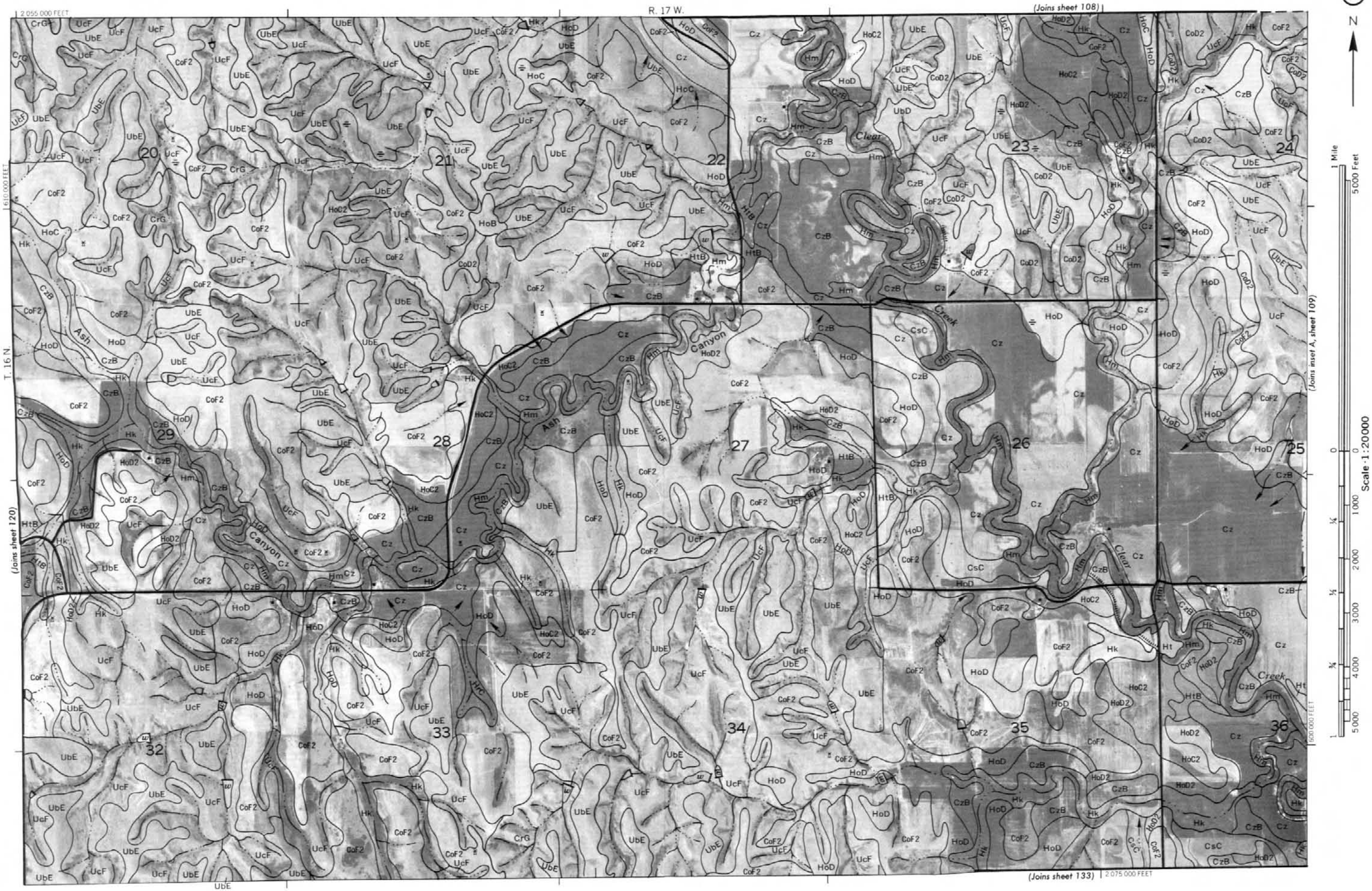

N
(Joins sheet 103)
(Joins sheet 115)
(Joins sheet 117)
(Joins sheet 128)
R. 21 W. R. 20 W.
T. 16 N.
1 960 000 FEET
610 000 FEET
600 000 FEET
1 940 000 FEET
1 Mile
5000 Feet
Scale 1:20000
0
1/4
1/2
3/4
1
1000
2000
3000
4000
5000
Ash
Creek
21
22
23
24
19
28
27
26
25
30
33
34
35
36
31
21


1 965 000 FEET
R. 20 W.
(Joins sheet 104)
610 000 FEET
T. 16 N.
(Joins sheet 116)
(Joins sheet 118)
(Joins sheet 129)
600 000 FEET
1 980 000 FEET
N
20
21
22
23
24
29
28
27
26
25
32
33
34
35
36
1 Mile
5000 Feet
0
¼
½
¾
1
0
1000
2000
3000
4000
5000
Scale 1:20000


118
N
R. 20 W. | R. 19 W.
(Joins sheet 105)
(Joins sheet 117)
(Joins sheet 119)
(Joins sheet 130)
T. 16 N.
Berwyn
Mud
Creek
BURLINGTON
NORTHERN
2 005 000 FEET
610 000 FEET
600 000 FEET
1 985 000 FEET
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
¼
½
¾
1
19
20
21
22
24
25
27
28
29
30
31
32
33
34
36

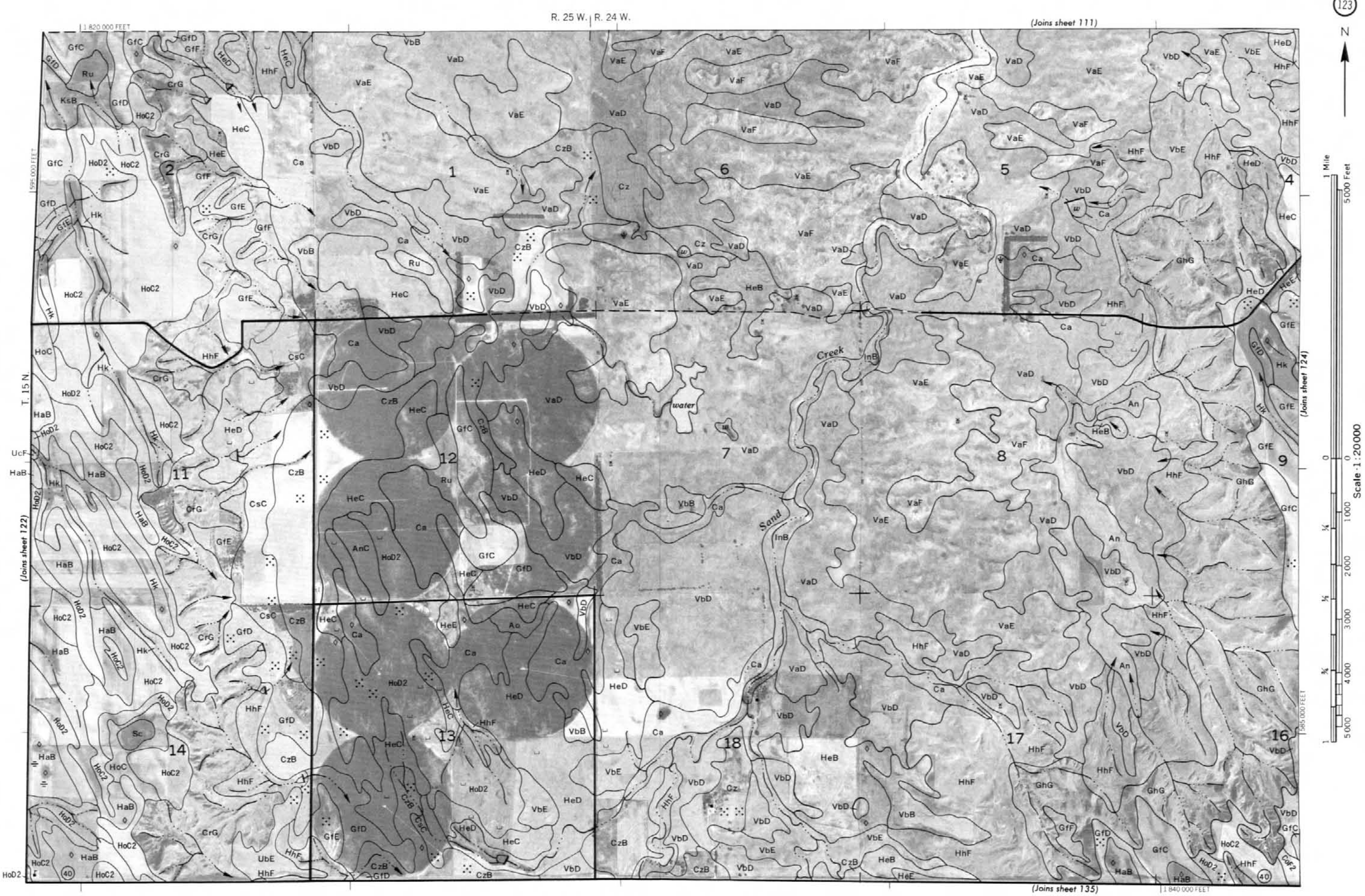

119
N
R. 19 W. | R. 18 W.
(Joins sheet 106)
(Joins sheet 118)
(Joins sheet 120)
(Joins sheet 131)
T. 16 N.
2 010 000 FEET
2 030 000 FEET
510 000 FEET
600 000 FEET
1 Mile
5000 Feet
Scale 1:20000
JANESVILLE CEMETERY
Goose Valley
Comer Canyon
Mud Creek
BURLINGTON NORTHERN
183
2
92
19
20
21
23
24
25
26
28
29
30
31
32
33
35
36


(Joins sheet 107)
(Joins sheet 119)
(Joins sheet 121)
(Joins sheet 132)
R. 18 W. | R. 17 W.
T. 16 N.
2 050 000 FEET
2 035 000 FEET
610 000 FEET
600 000 FEET
N
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
¼
½
¾
1
183
Ash
Canyon
19
21
22
23
24
25
26
27
28
30
31
33
34
35
36

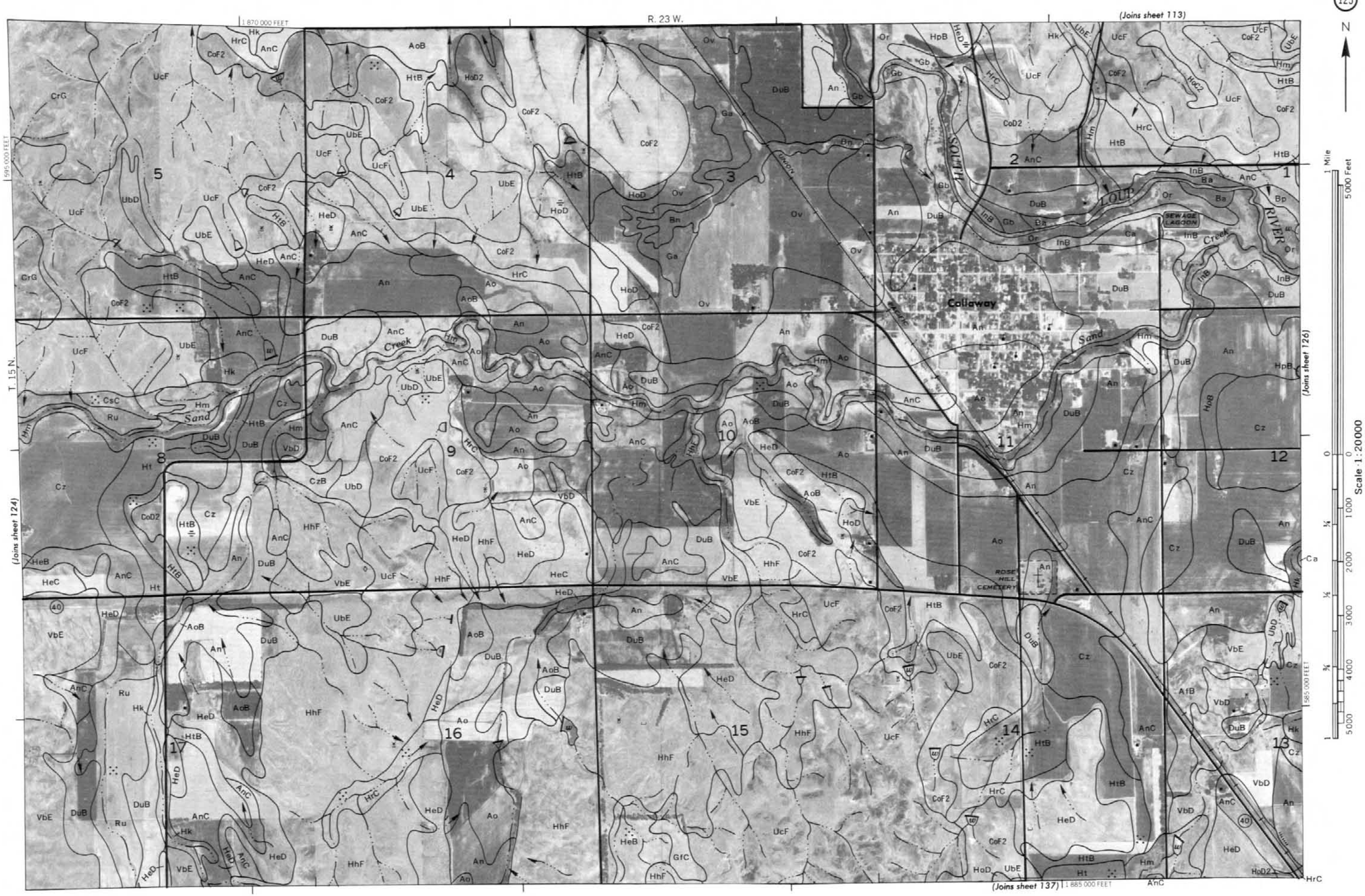


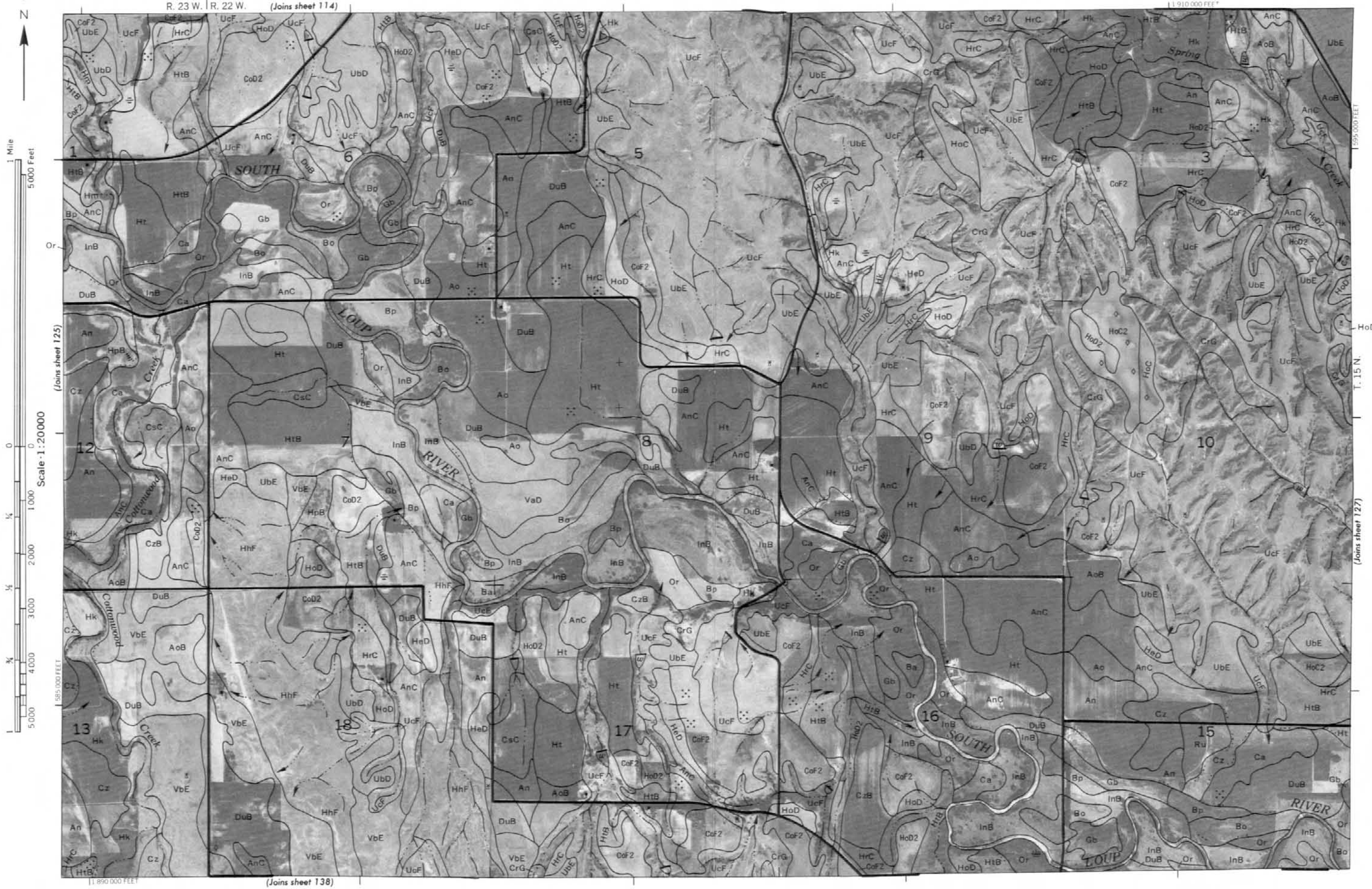
121
N
R. 17 W.
(Joins sheet 108)
(Joins inset A, sheet 109)
(Joins sheet 133)
(Joins sheet 120)
T. 16 N.
2 055 000 FEET
610 000 FEET
2 075 000 FEET
590 000 FEET
Clear
Creek
Ash
Canyon
20
21
22
23
24
25
26
27
28
29
32
33
34
35
36
1 Mile
5000 Feet
Scale 1:20000

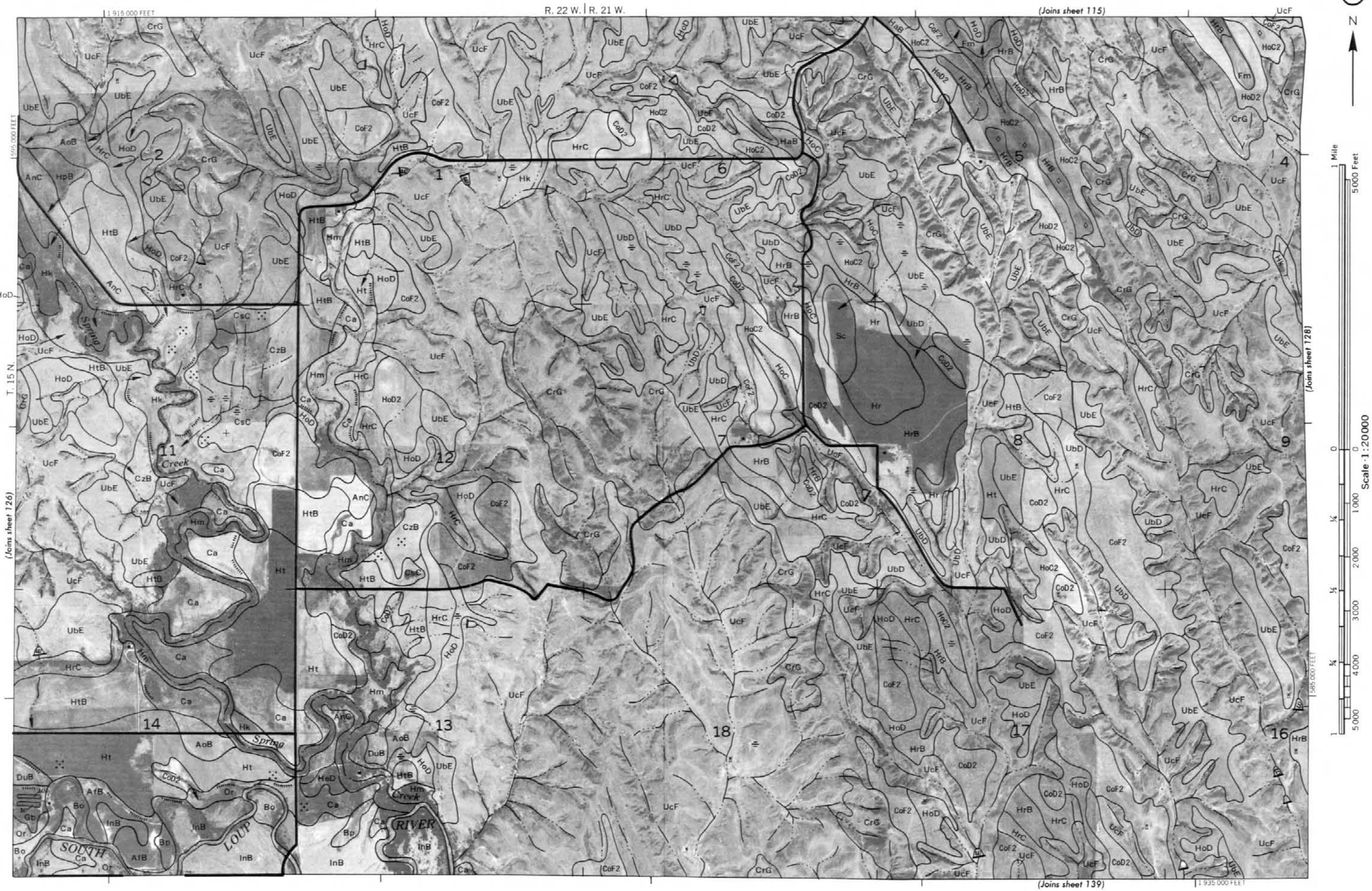

122
N
(Joins sheet 110)
R. 25 W.
1 815 000 FEET
595 000 FEET
T. 15 N.
(Joins sheet 123)
(Joins sheet 134)
1 800 000 FEET
585 000 FEET
LINCOLN COUNTY
Scale 1:20000
1 Mile
5000 Feet
0
1000
2000
3000
4000
5000
0
¼
½
¾
1
Tallin
Table
40
6
5
4
3
7
8
9
10
18
17
16
15


123
N
R. 25 W. | R. 24 W.
1 820 000 FEET
(Joins sheet 111)
(Joins sheet 122)
(Joins sheet 124)
(Joins sheet 135)
T. 15 N.
595 000 FEET
585 000 FEET
1 840 000 FEET
1 Mile
5000 Feet
Scale 1:20000
Sand Creek
water

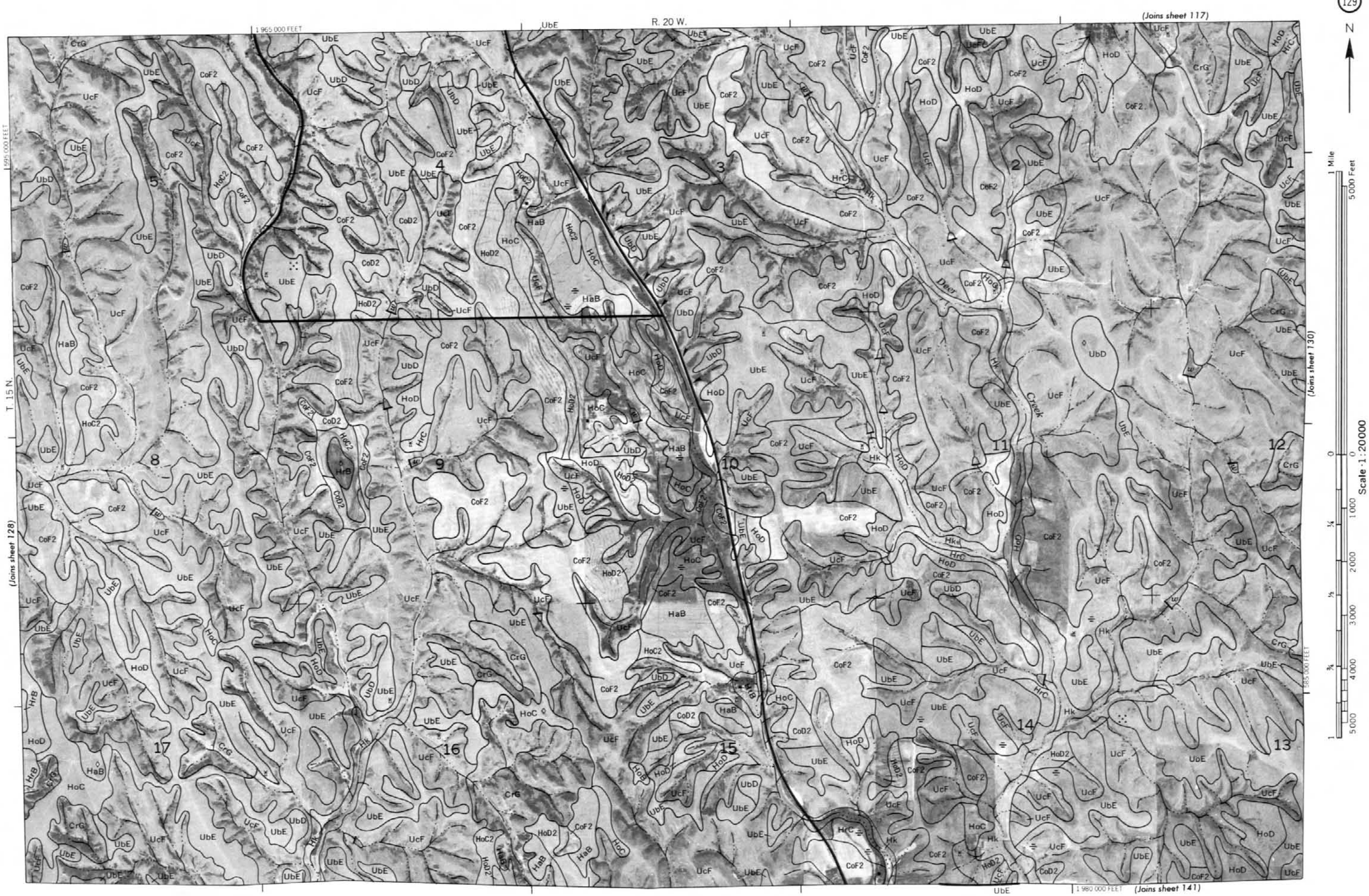

N
(Joins sheet 112)
R. 24 W. | R. 23 W.
1 865 000 FEET
595 000 FEET
T. 15 N.
(Joins sheet 125)
(Joins sheet 123)
(Joins sheet 136)
1 845 000 FEET
585 000 FEET
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
¼
½
¾
1
Sand
Creek
Sand
Valley
SAND VALLEY CEMETERY
1
2
3
4
6
7
9
10
11
12
13
14
15
16
18
40


(Joins sheet 113)
R. 23 W.
1 870 000 FEET
595 000 FEET
T. 15 N.
(Joins sheet 124)
(Joins sheet 126)
(Joins sheet 137)
1 885 000 FEET
585 000 FEET
N
Callaway
SOUTH LOUP RIVER
Sand Creek
Sand Creek
UNION PACIFIC
SEWAGE LAGOON
ROSE HILL CEMETERY
40
1
2
3
4
5
8
9
10
11
12
13
14
15
16
17
1 Mile
5 000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
0
¼
½
¾
1

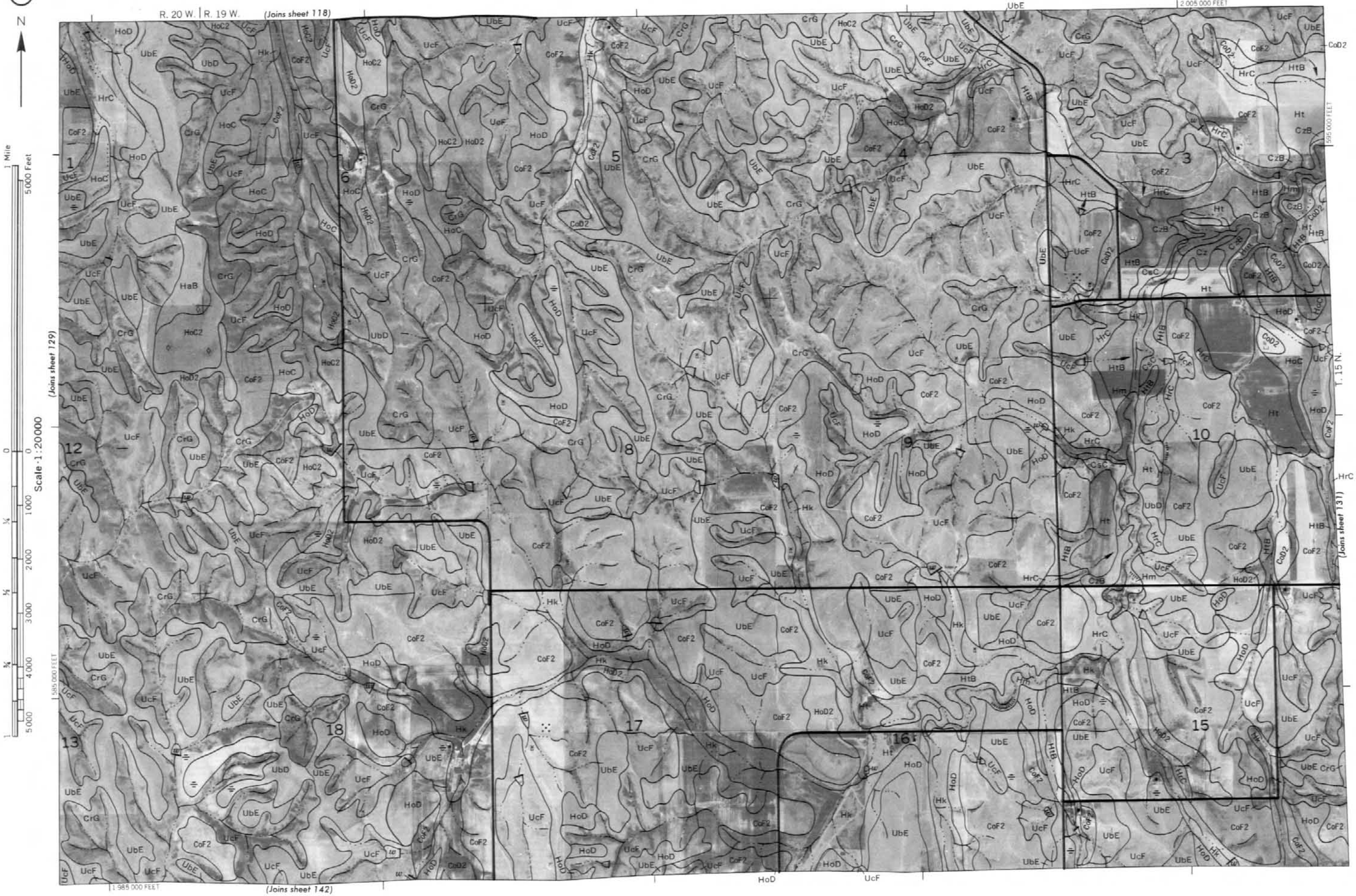

N
R. 23 W.
R. 22 W.
(Joins sheet 114)
(Joins sheet 125)
(Joins sheet 127)
(Joins sheet 138)
T. 15 N.
1 910 000 FEET
595 000 FEET
585 000 FEET
1 890 000 FEET
1 Mile
5000 Feet
Scale 1:20000
SOUTH
LOUP
RIVER
Spring
Creek
Cottonwood
1
3
4
5
6
7
8
9
10
12
13
15
16
17
18

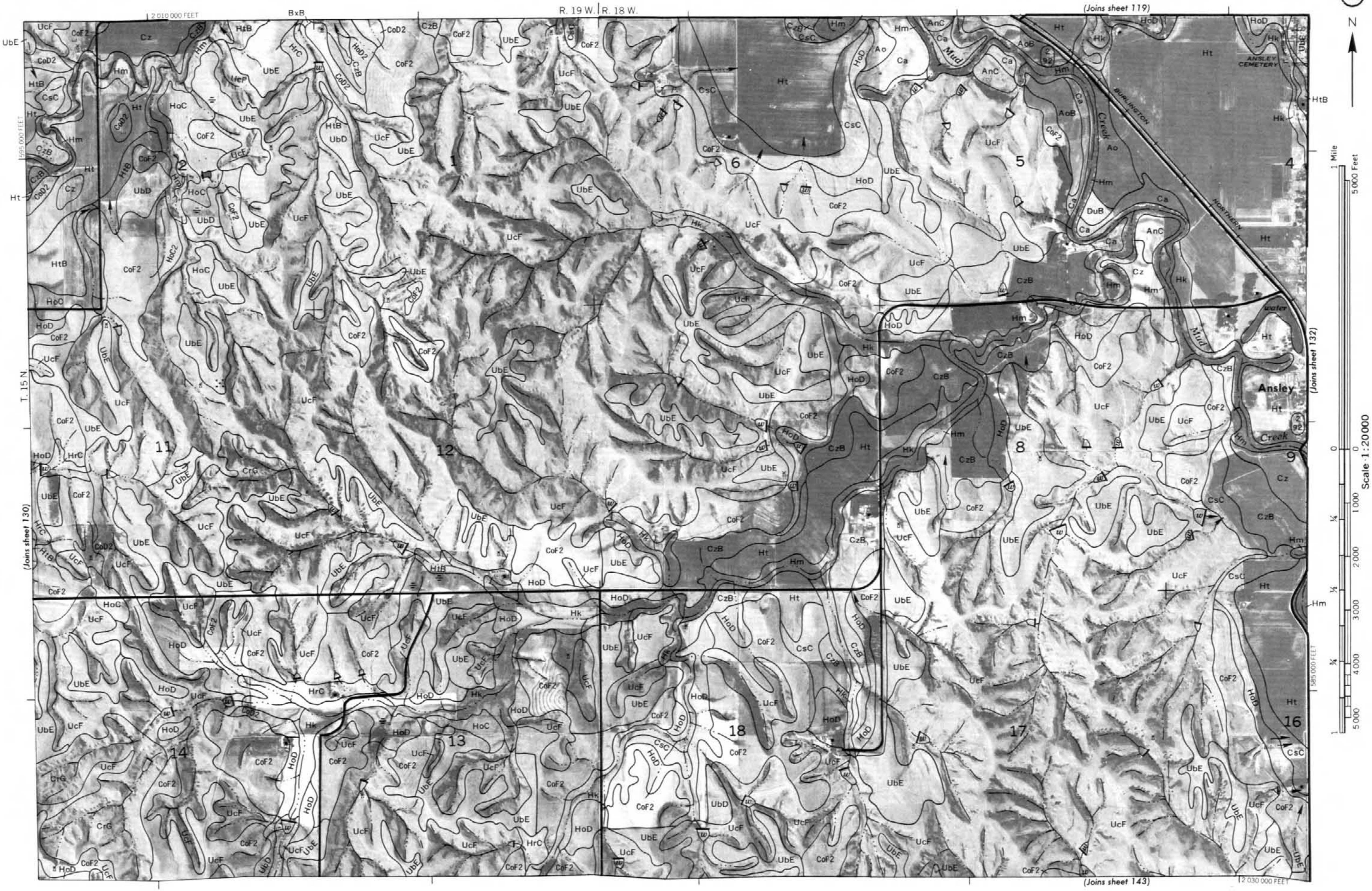

127
N
R. 22 W.
R. 21 W.
(Joins sheet 115)
(Joins sheet 128)
(Joins sheet 139)
(Joins sheet 126)
T. 15 N.
1 915 000 FEET
1 935 000 FEET
595 000 FEET
585 000 FEET
1 Mile
5000 Feet
Scale 1:20000
Spring Creek
SOUTH LOUP RIVER

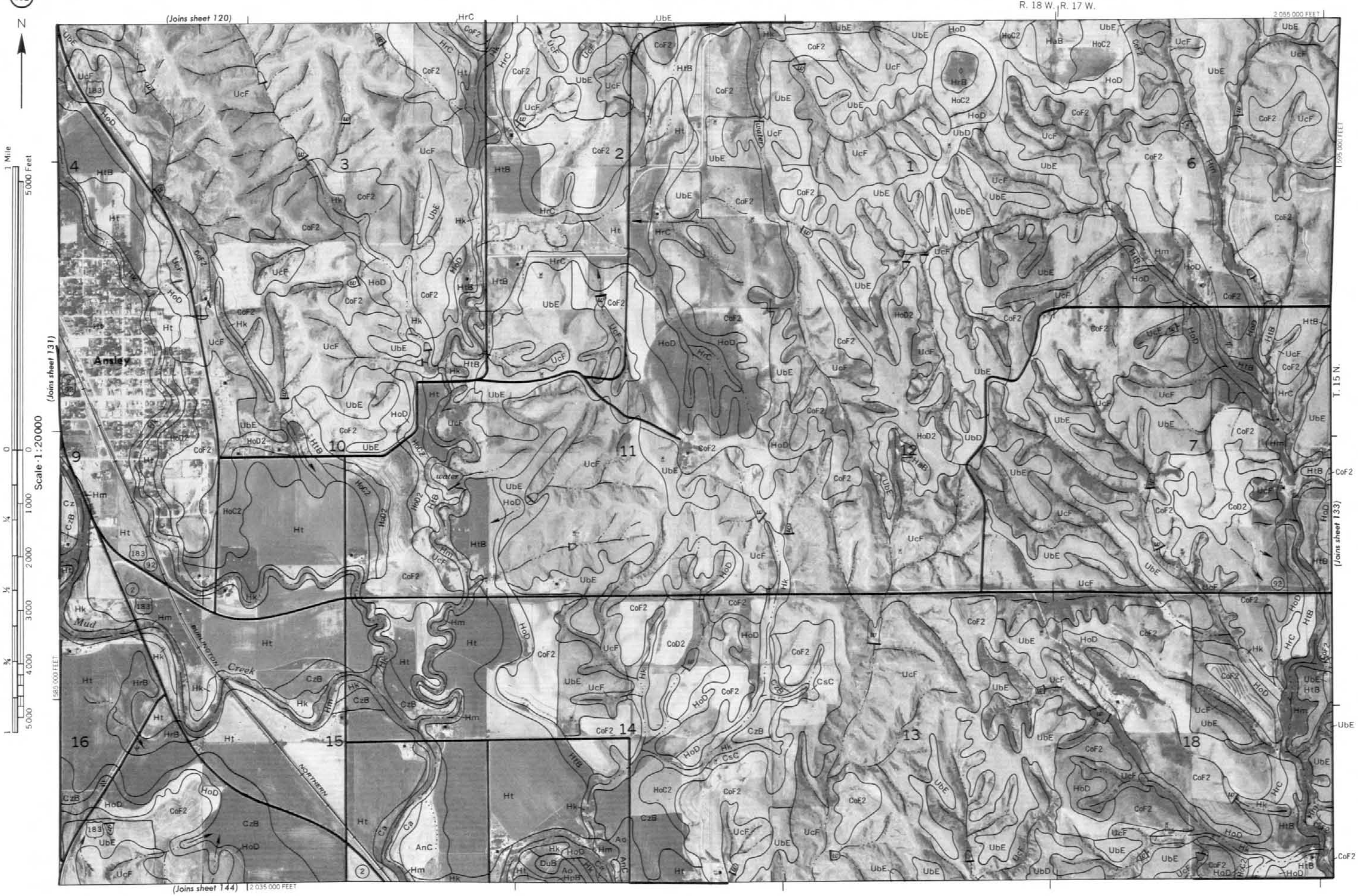

(Joins sheet 116)
R. 21 W. | R. 20 W.
1 960 000 FEET
595 000 FEET
T. 15 N.
(Joins sheet 127)
(Joins sheet 129)
(Joins sheet 140)
1 940 000 FEET
585 000 FEET
N
1 Mile
5000 Feet
Scale 1:20000
Ash Creek
Hay Creek

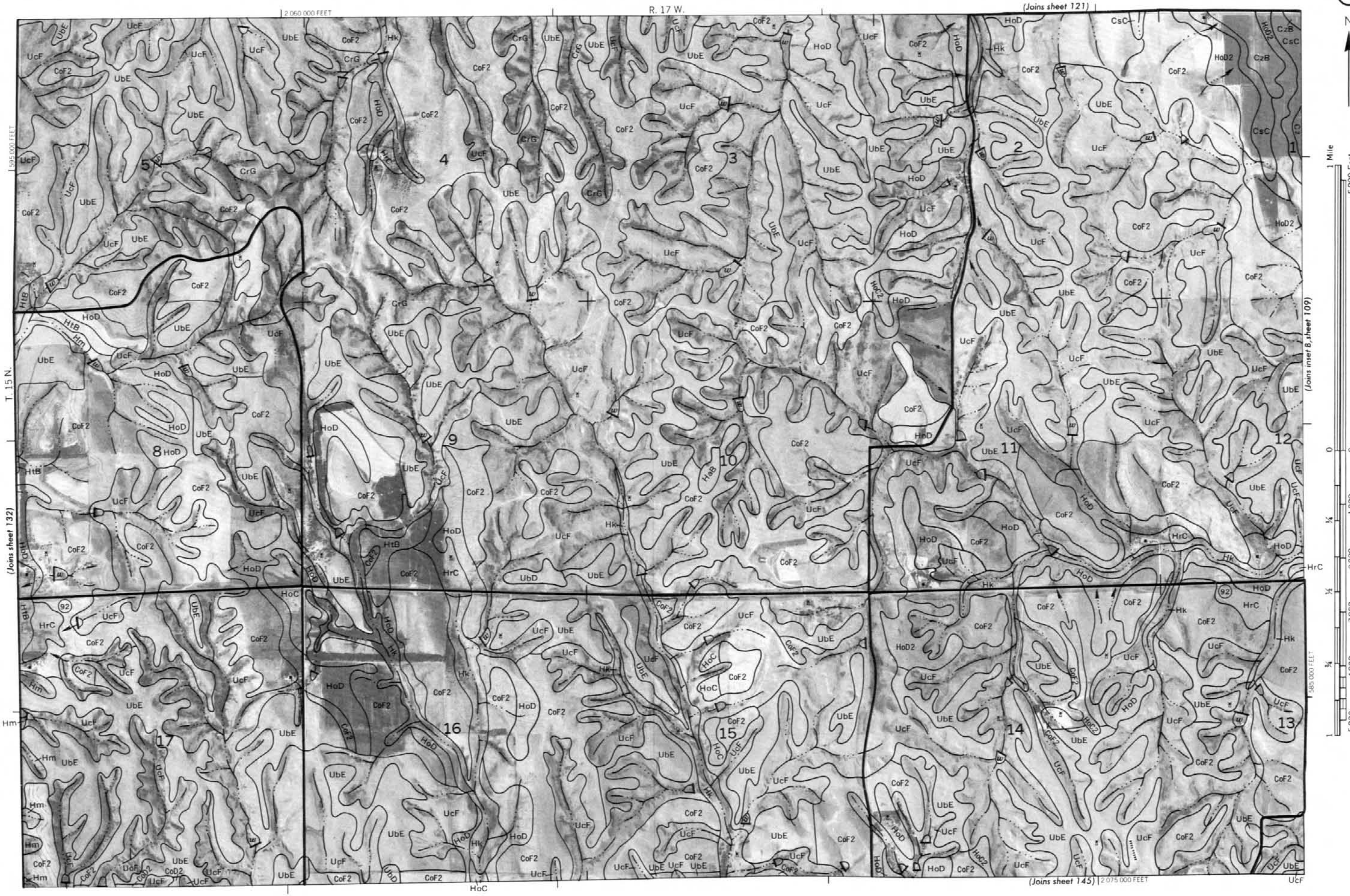

129
N
(Joins sheet 117)
R. 20 W.
1 965 000 FEET
595 000 FEET
T. 15 N.
(Joins sheet 128)
(Joins sheet 130)
585 000 FEET
1 980 000 FEET
(Joins sheet 141)
Deer Creek
1 Mile
5000 Feet
Scale 1:20000
0 1000 2000 3000 4000 5000

CUSTER COUNTY, NEBRASKA — SHEET NUMBER 130

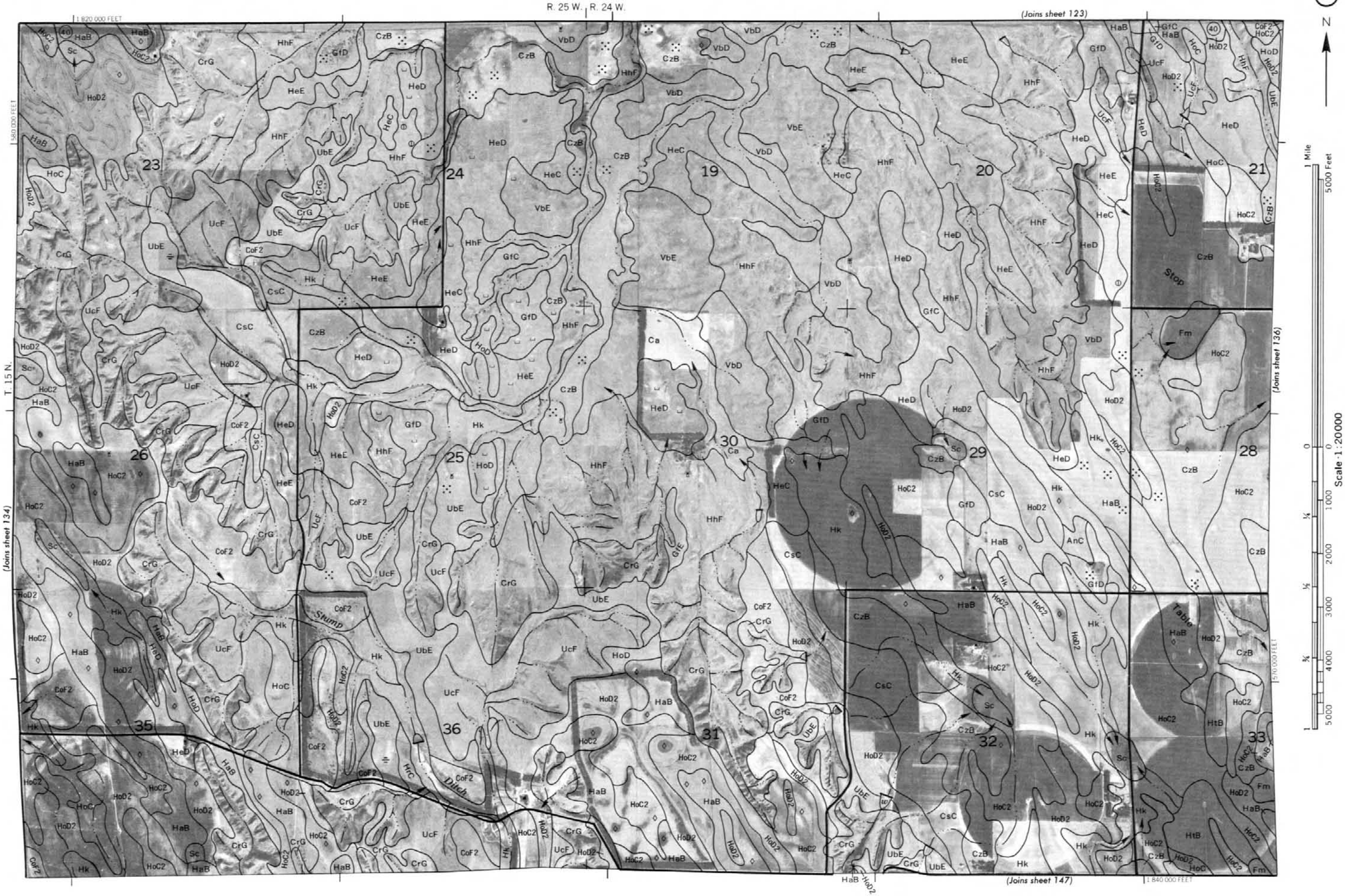


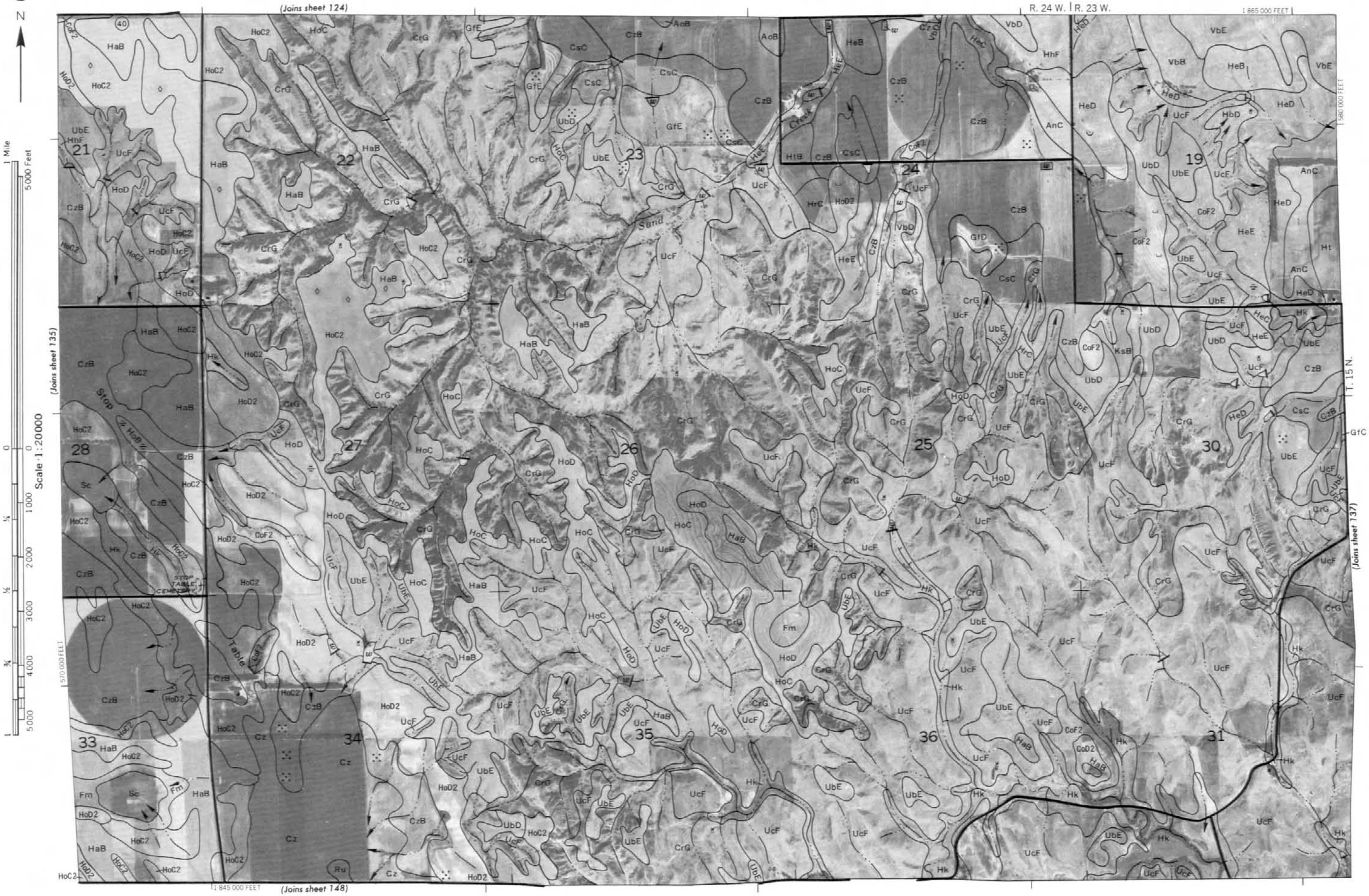

2 010 000 FEET
R. 19 W.
R. 18 W.
(Joins sheet 119)
N
ANSLEY CEMETERY
BURLINGTON
NORTHERN
Mud
Creek
Ansley
T. 15 N.
(Joins sheet 130)
(Joins sheet 132)
(Joins sheet 143)
595 000 FEET
585 000 FEET
2 030 000 FEET
1 Mile
5000 Feet
Scale 1:20000
1
2
4
5
6
7
8
9
11
12
13
14
16
17
18

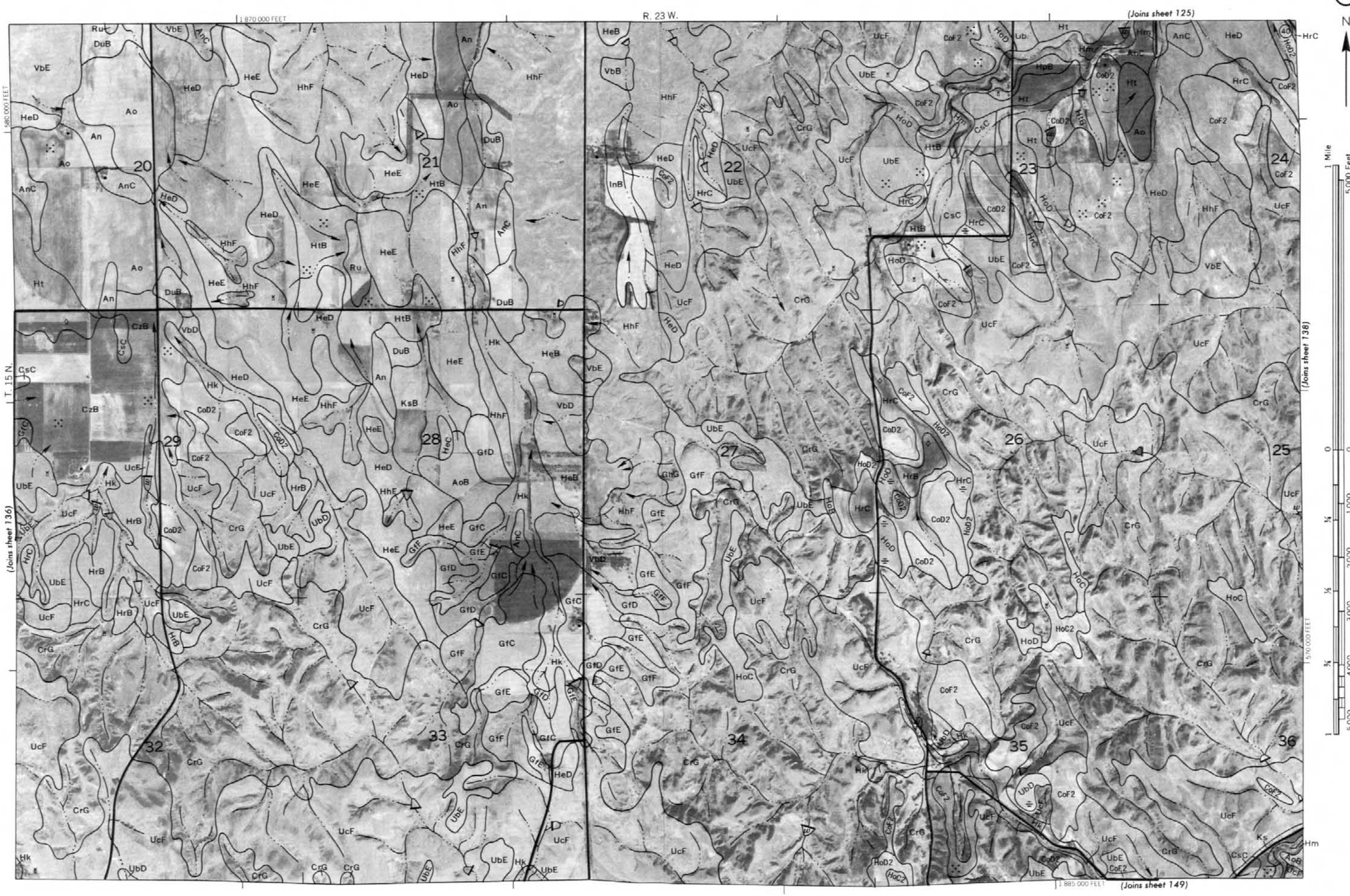

N
(Joins sheet 120)
(Joins sheet 131)
(Joins sheet 133)
(Joins sheet 144)
R. 18 W.
R. 17 W.
T. 15 N.
2 055 000 FEET
2 035 000 FEET
595 000 FEET
585 000 FEET
1 Mile
5000 Feet
Scale 1:20000
Ansley
Mud
Creek
BURLINGTON
NORTHERN
water
1
2
3
4
6
7
9
10
11
12
13
14
15
16
18

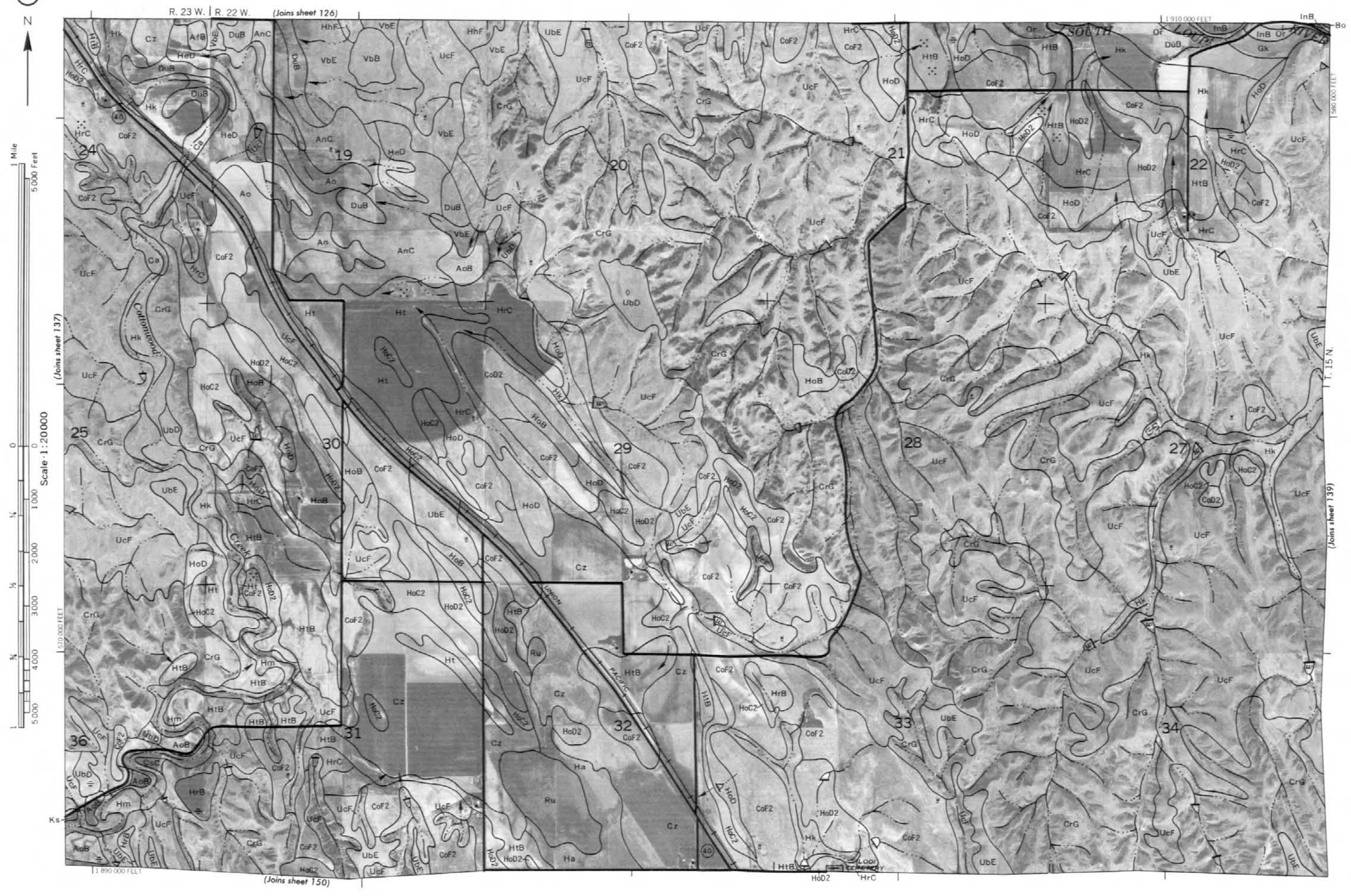

R. 17 W.
T. 15 N.
(Joins sheet 121)
(Joins sheet 132)
(Joins inset B, sheet 109)
(Joins sheet 145)
2 060 000 FEET
2 075 000 FEET
595 000 FEET
585 000 FEET
N
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
0
¼
½
¾
1

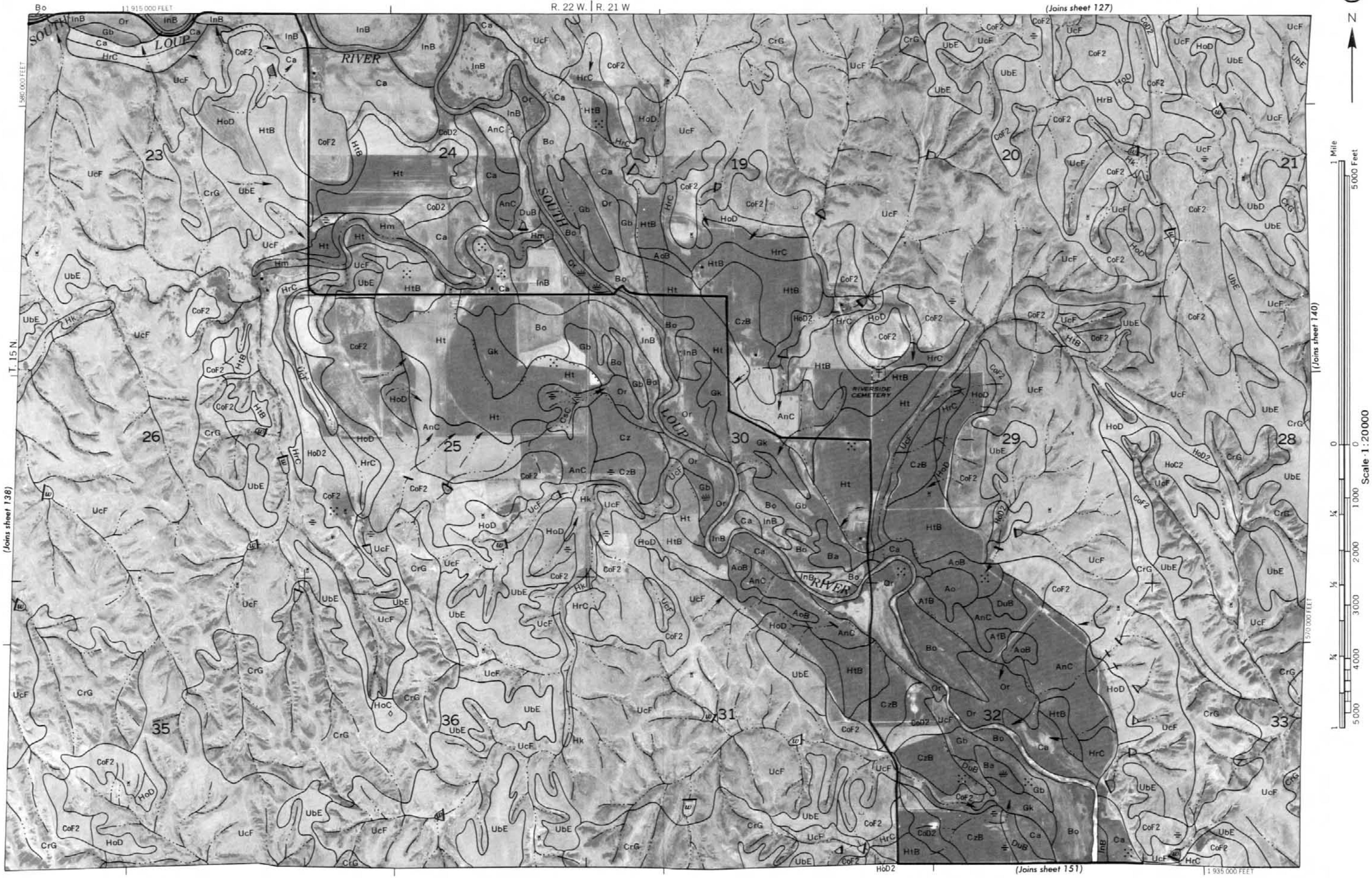

134
N
1 Mile
5000 Feet
Scale 1:20000
(Joins sheet 122)
R. 25 W.
1 815 000 FEET
580 000 FEET
570 000 FEET
1 800 000 FEET
(Joins sheet 146)
(Joins sheet 135)
T. 15 N.
LINCOLN COUNTY
19
20
21
22
30
29
28
27
31
32
33
34
Tallin
Tabre

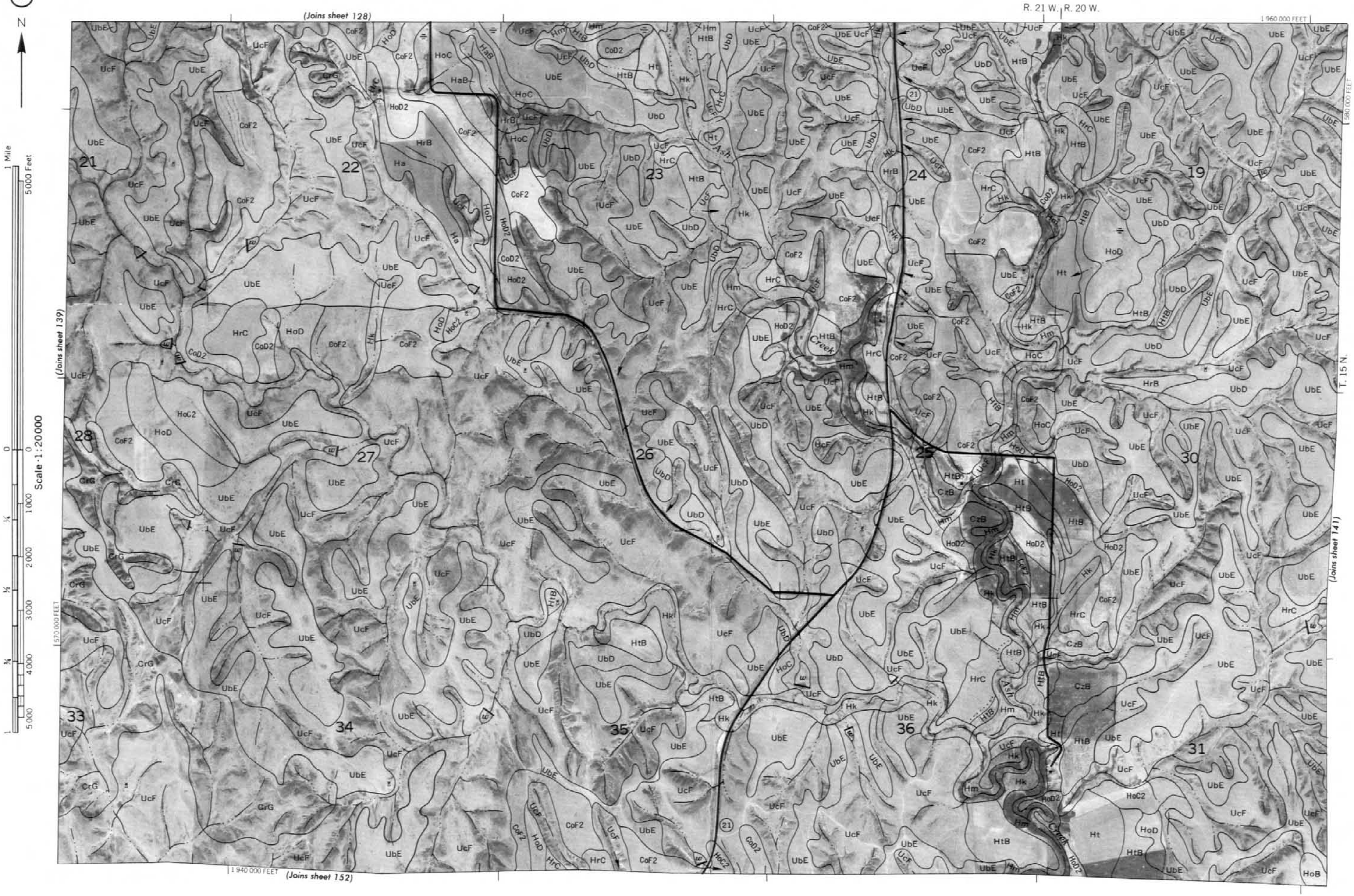

R. 25 W.
R. 24 W.
T. 15 N.
1 820 000 FEET
580 000 FEET
570 000 FEET
1 840 000 FEET
(Joins sheet 123)
(Joins sheet 136)
(Joins sheet 147)
(Joins sheet 134)
N
23
24
19
20
21
26
25
30
29
28
35
36
31
32
33
Stump
Ditch
Stop
Table
1 Mile
5000 Feet
Scale 1:20000
0
1/4
1/2
3/4
1
1000
2000
3000
4000
5000


N
(Joins sheet 124)
(Joins sheet 135)
(Joins sheet 137)
(Joins sheet 148)
R. 24 W.
R. 23 W.
T. 15 N.
1 865 000 FEET
580 000 FEET
570 000 FEET
1 845 000 FEET
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
¼
½
¾
1
21
22
23
24
19
28
27
26
25
30
33
34
35
36
31
Stop
Table
Sand
Creek
STOP TABLE CEMETERY
40

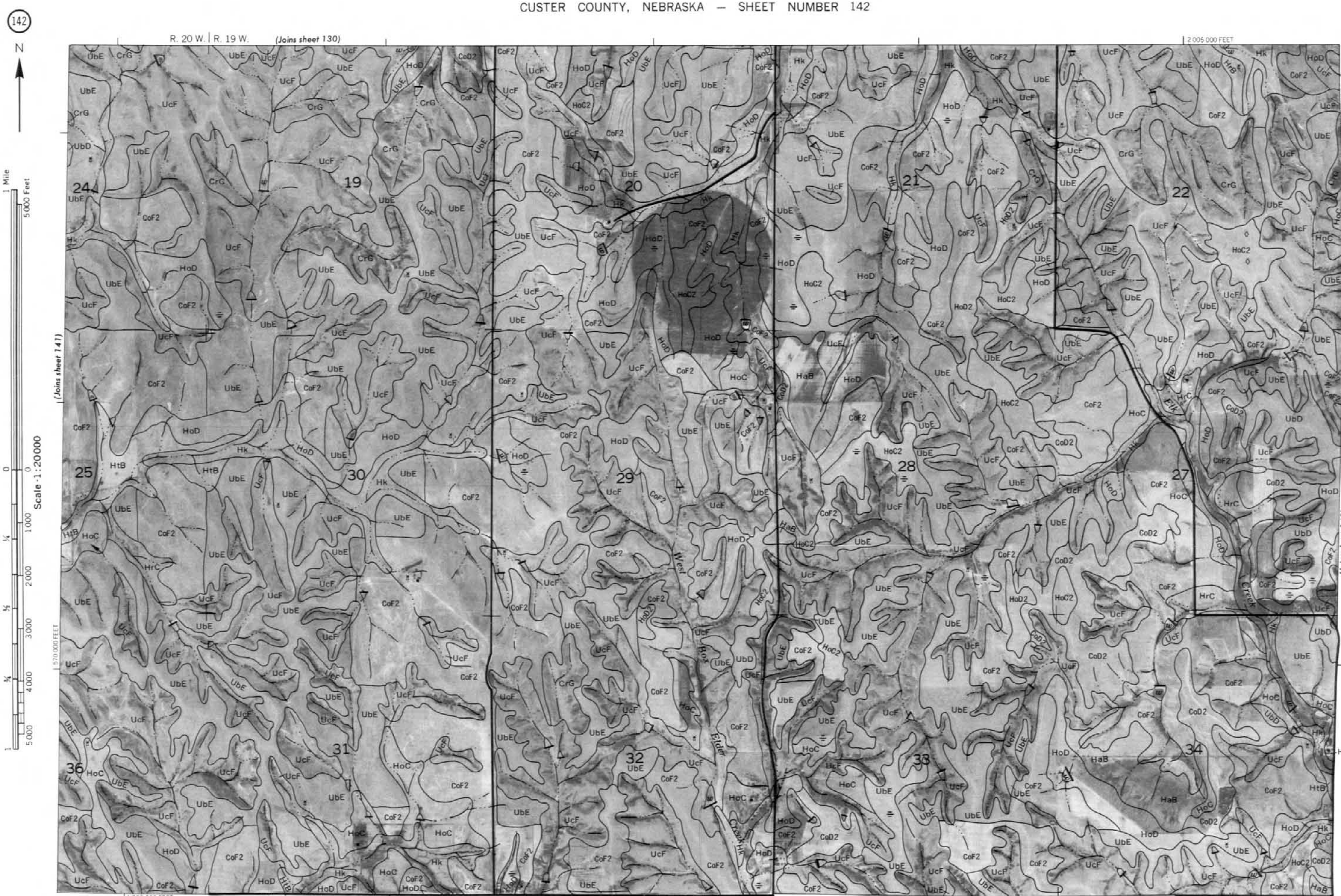

137
N
R. 23 W.
1 870 000 FEET
(Joins sheet 125)
580 000 FEET
T. 15 N.
(Joins sheet 136)
(Joins sheet 138)
570 000 FEET
1 885 000 FEET
(Joins sheet 149)
1 Mile
5000 Feet
0
Scale 1:20000
20
21
22
23
24
25
26
27
28
29
32
33
34
35
36


N
R. 23 W.
R. 22 W.
(Joins sheet 126)
(Joins sheet 137)
(Joins sheet 139)
(Joins sheet 150)
T. 15 N.
1 910 000 FEET
580 000 FEET
570 000 FEET
1 890 000 FEET
1 Mile
5000 Feet
Scale 1:20000
SOUTH LOUP RIVER
Cottonwood Creek
UNION PACIFIC
LODI CEMETERY
19
20
21
22
24
25
27
28
29
30
31
32
33
34
36

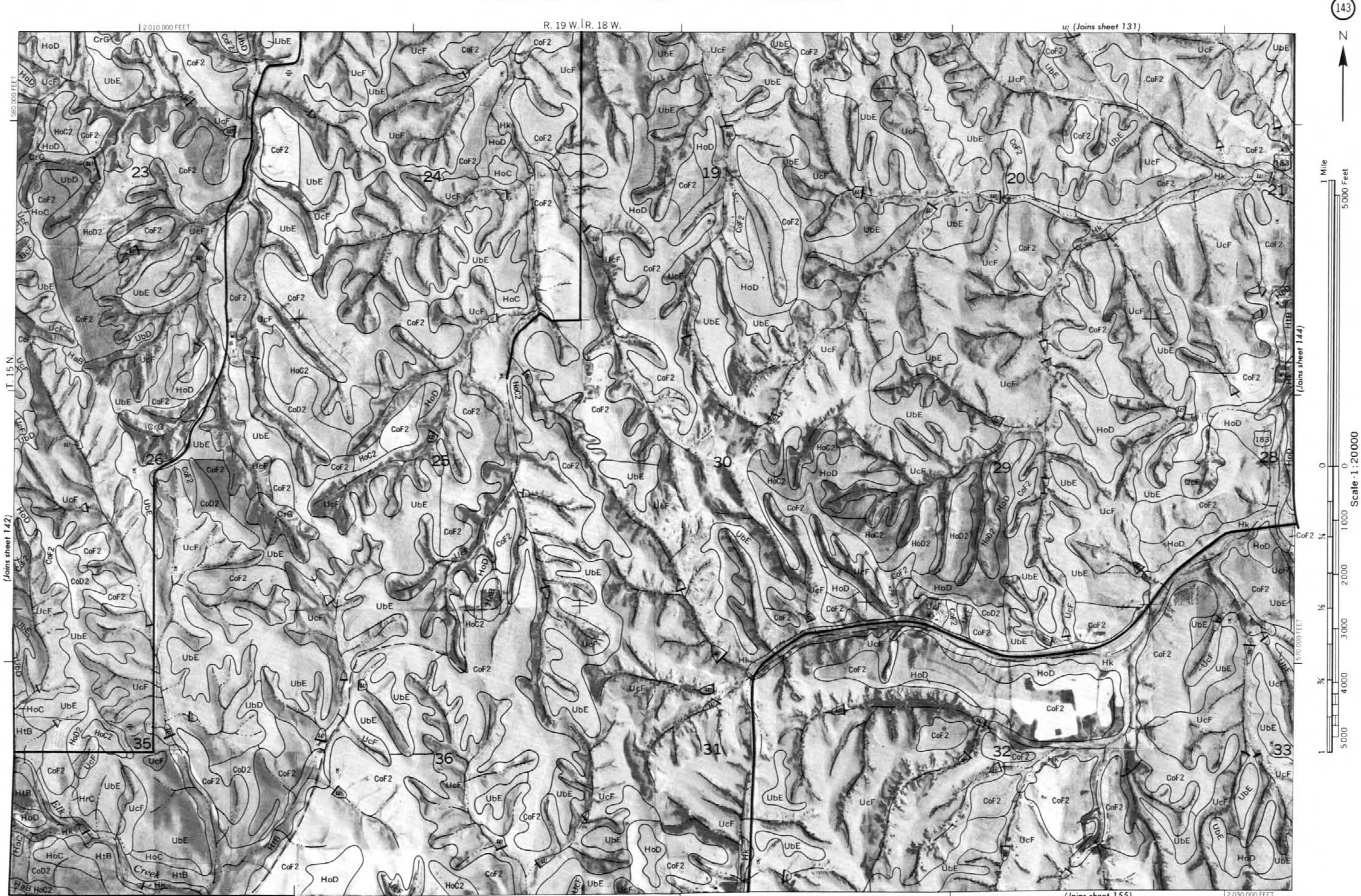

N
(Joins sheet 127)
(Joins sheet 140)
(Joins sheet 151)
(Joins sheet 138)
R. 22 W. | R. 21 W
T. 15 N.
1 915 000 FEET
1 935 000 FEET
580 000 FEET
570 000 FEET
SOUTH LOUP RIVER
SOUTH LOUP RIVER
RIVERSIDE CEMETERY
19
20
21
23
24
25
26
28
29
30
31
32
33
35
36
1 Mile
5000 Feet
Scale 1:20000

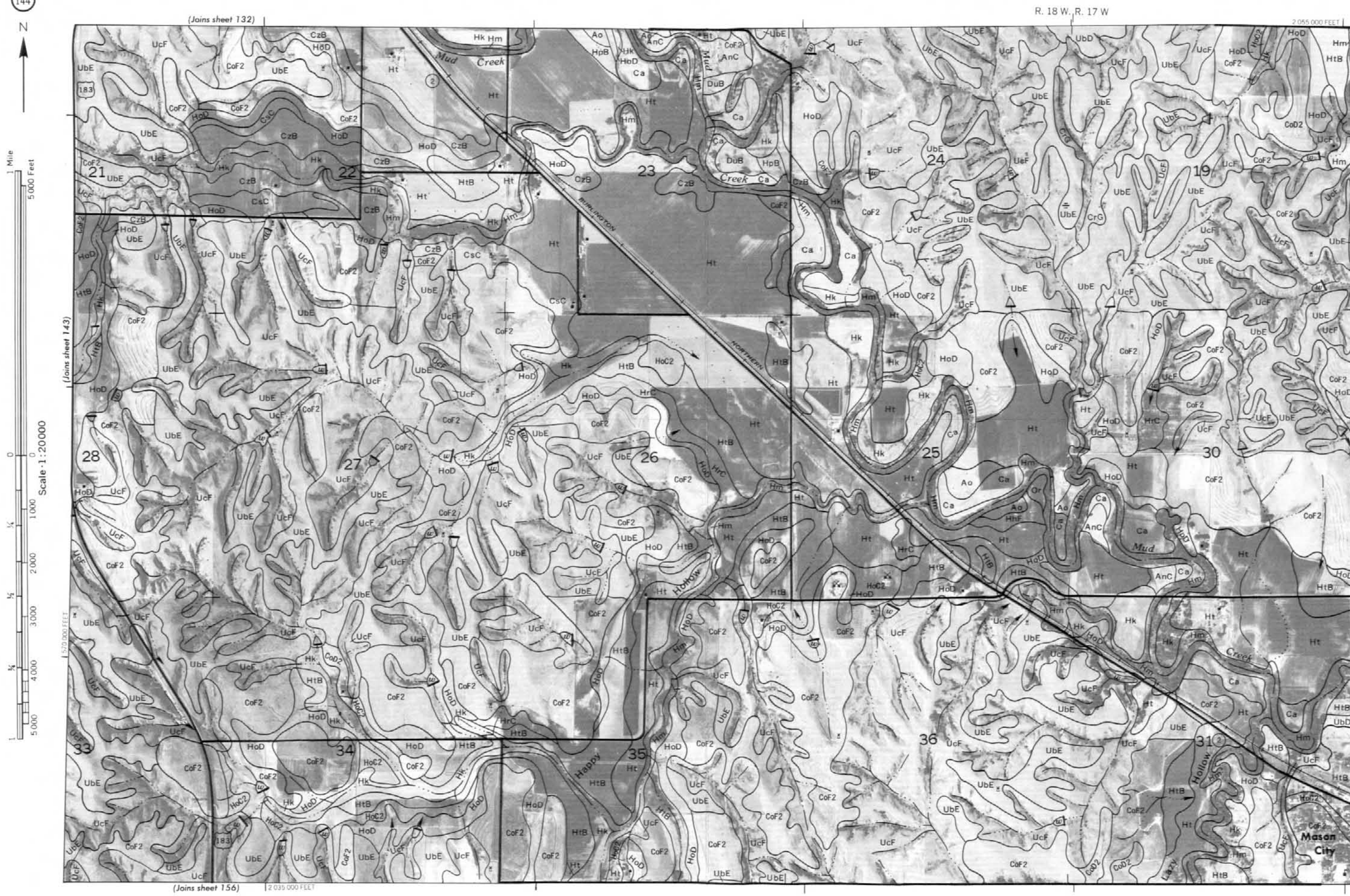

N
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
¼
½
¾
(Joins sheet 128)
(Joins sheet 139)
(Joins sheet 141)
(Joins sheet 152)
R. 21 W.
R. 20 W.
T. 15 N.
1 960 000 FEET
580 000 FEET
570 000 FEET
1 940 000 FEET
19
21
22
23
24
25
26
27
28
30
31
33
34
35
36
Ash
Creek
21

(Joins sheet 129)
(Joins sheet 142)
(Joins sheet 140)
(Joins sheet 153)
R. 20 W.
T. 15 N.
1 965 000 FEET
580 000 FEET
570 000 FEET
1 980 000 FEET
N
1 Mile
5000 Feet
Scale 1:20000

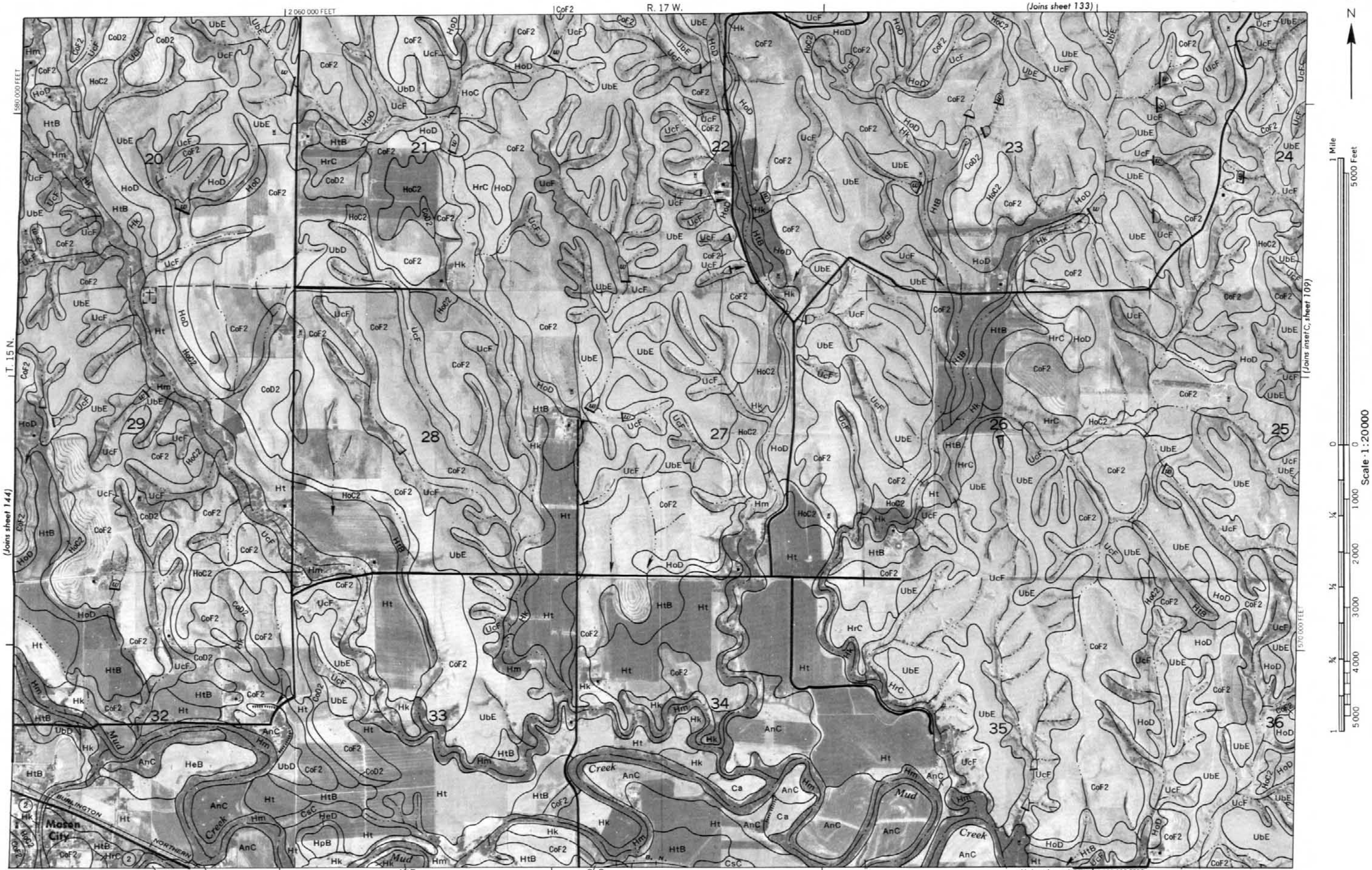

142
N
R. 20 W. | R. 19 W.
(Joins sheet 130)
(Joins sheet 141)
(Joins sheet 143)
(Joins sheet 154)
T. 15 N.
2 005 000 FEET
580 000 FEET
570 000 FEET
1 985 000 FEET
1 Mile
5000 Feet
Scale 1:20000
19
20
21
22
24
25
27
28
29
30
31
32
33
34
36
Elk
West
Box
Elder
Creek
Crook
HtB

CUSTER COUNTY, NEBRASKA — SHEET NUMBER 143

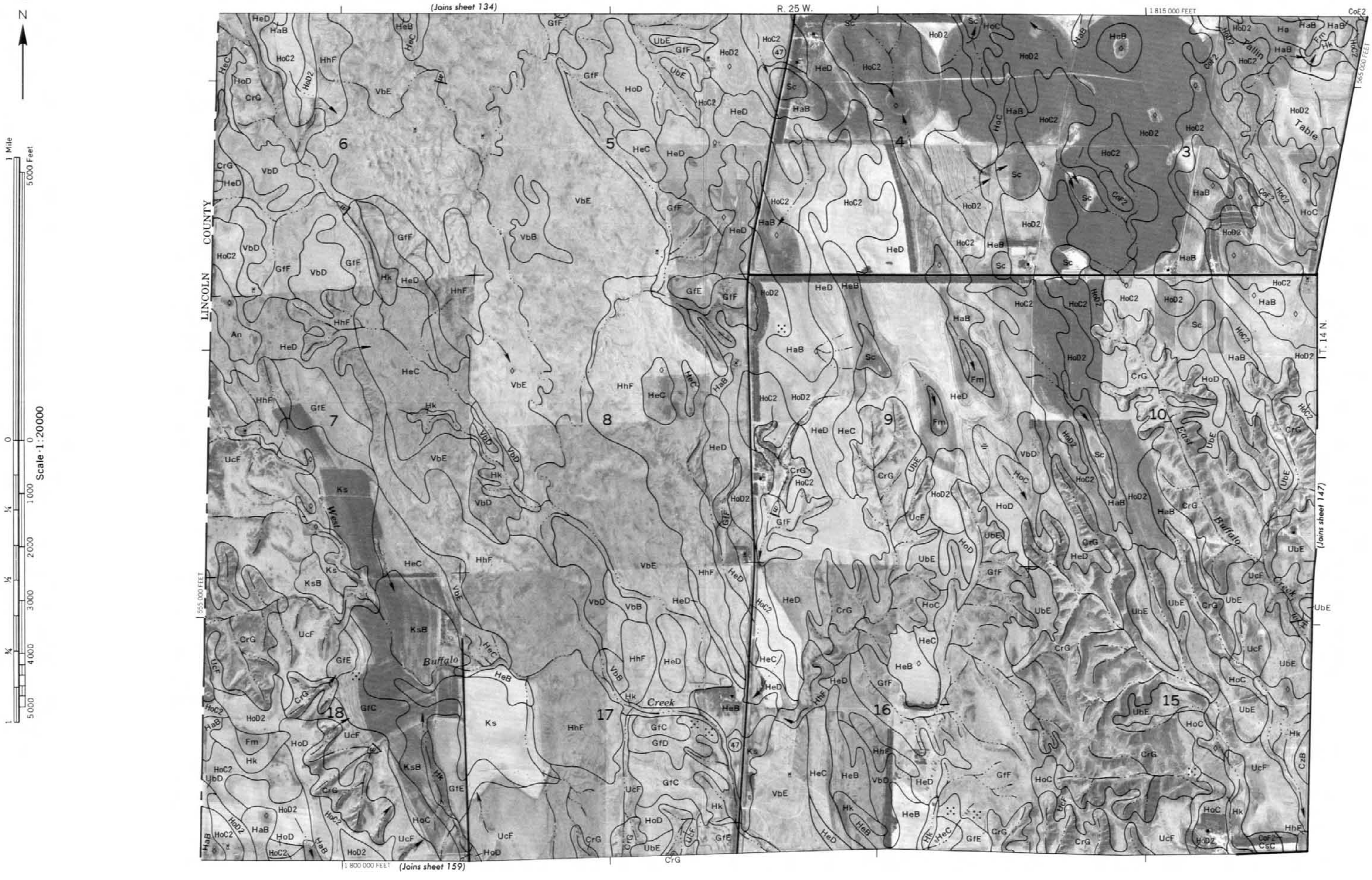


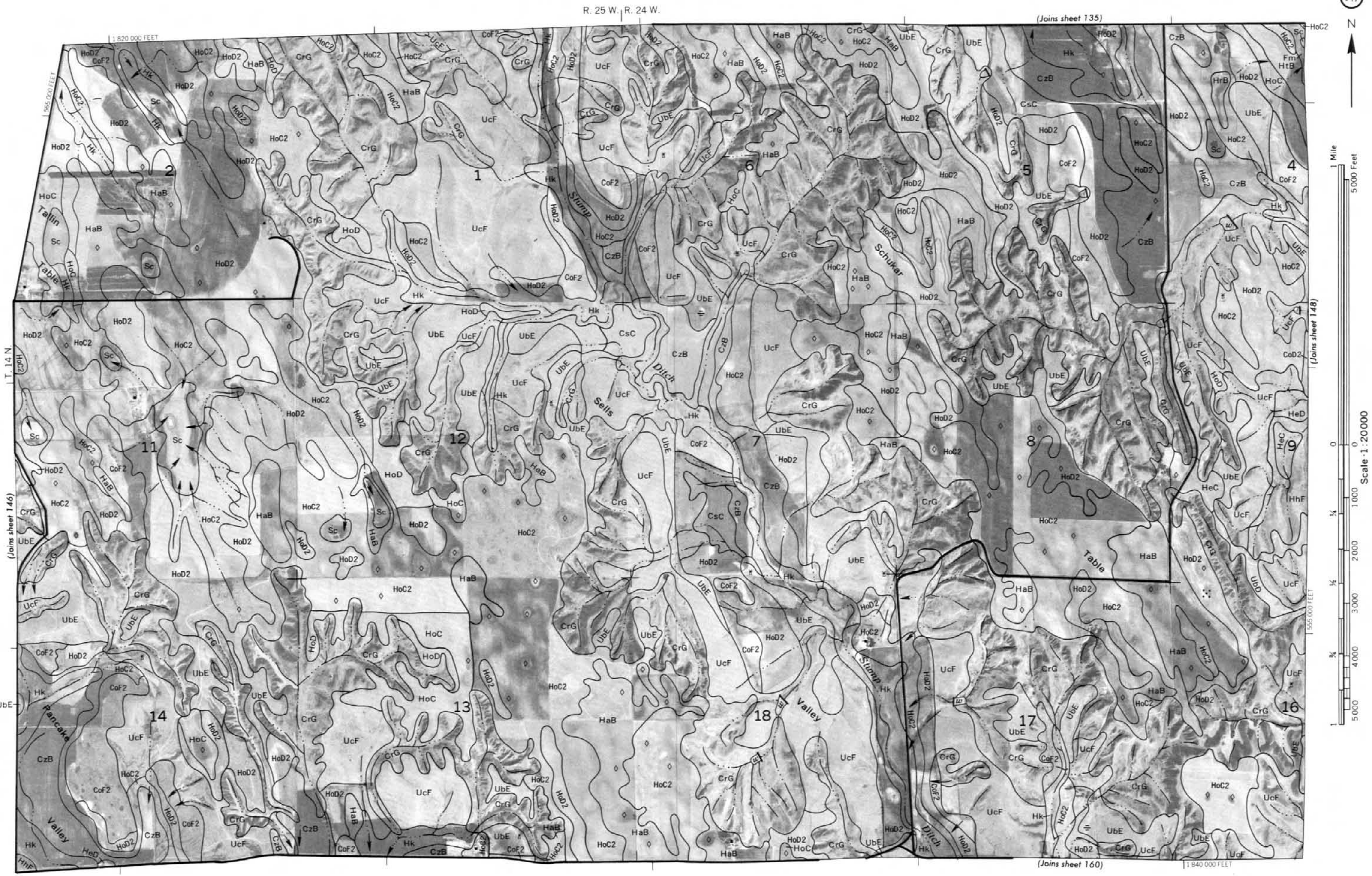

N
1 Mile
5 000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
(Joins sheet 132)
(Joins sheet 143)
(Joins sheet 145)
(Joins sheet 156)
R. 18 W.
R. 17 W.
T. 15 N.
2 055 000 FEET
2 035 000 FEET
580 000 FEET
570 000 FEET
Mud Creek
Creek
Mud
Happy Hollow
Lazy Hollow
BURLINGTON
NORTHERN
Mason City
183
21
22
23
24
19
28
27
26
25
30
33
34
35
36
31

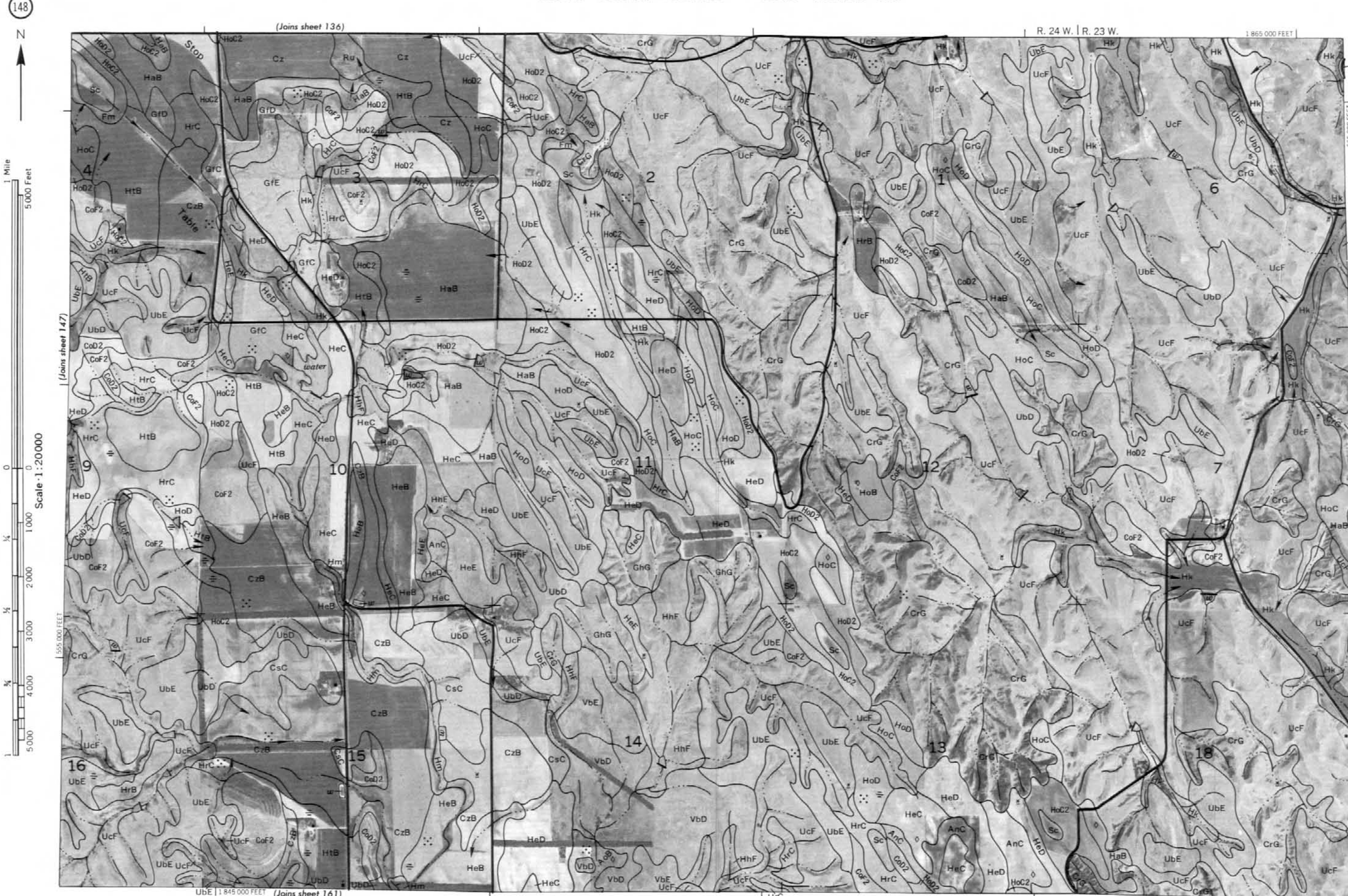
CUSTER COUNTY, NEBRASKA — SHEET NUMBER 145

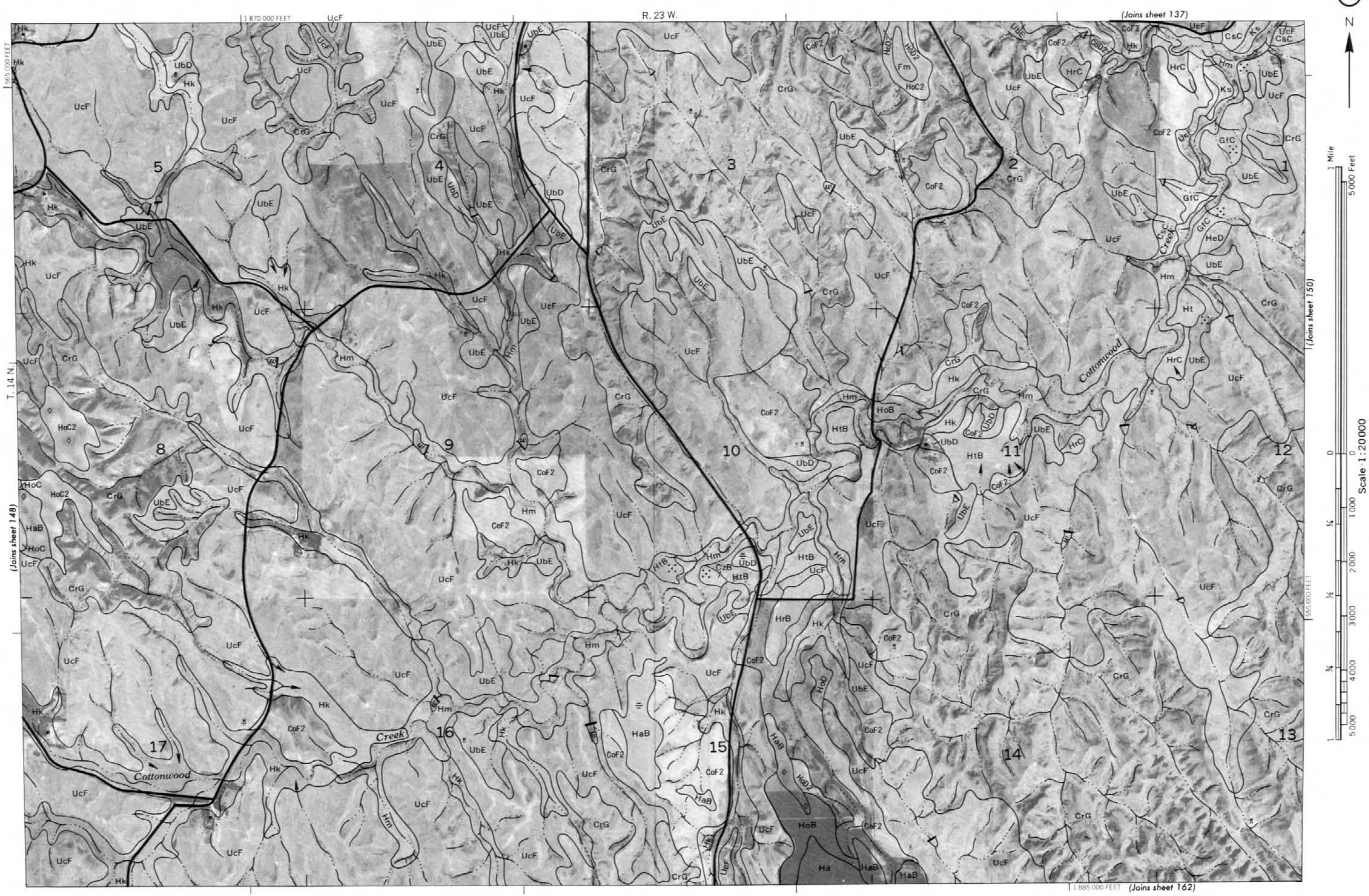


146


N
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
(Joins sheet 134)
R. 25 W.
1 815 000 FEET
555 000 FEET
T. 14 N.
(Joins sheet 147)
(Joins sheet 159)
1 800 000 FEET
LINCOLN COUNTY
West Buffalo Creek
East Buffalo Creek
Table
Yallin
3
4
5
6
7
8
9
10
15
16
17
18
47
HoD2
HoC2
HaB
HeD
HeC
HeB
HhF
VbE
VbD
VbB
GfF
GfE
GfC
GfD
CrG
UbE
UcF
Ks
KsB
Hk
Sc
Fm
An
CoF2
CsC
HoC
HoD
UbD

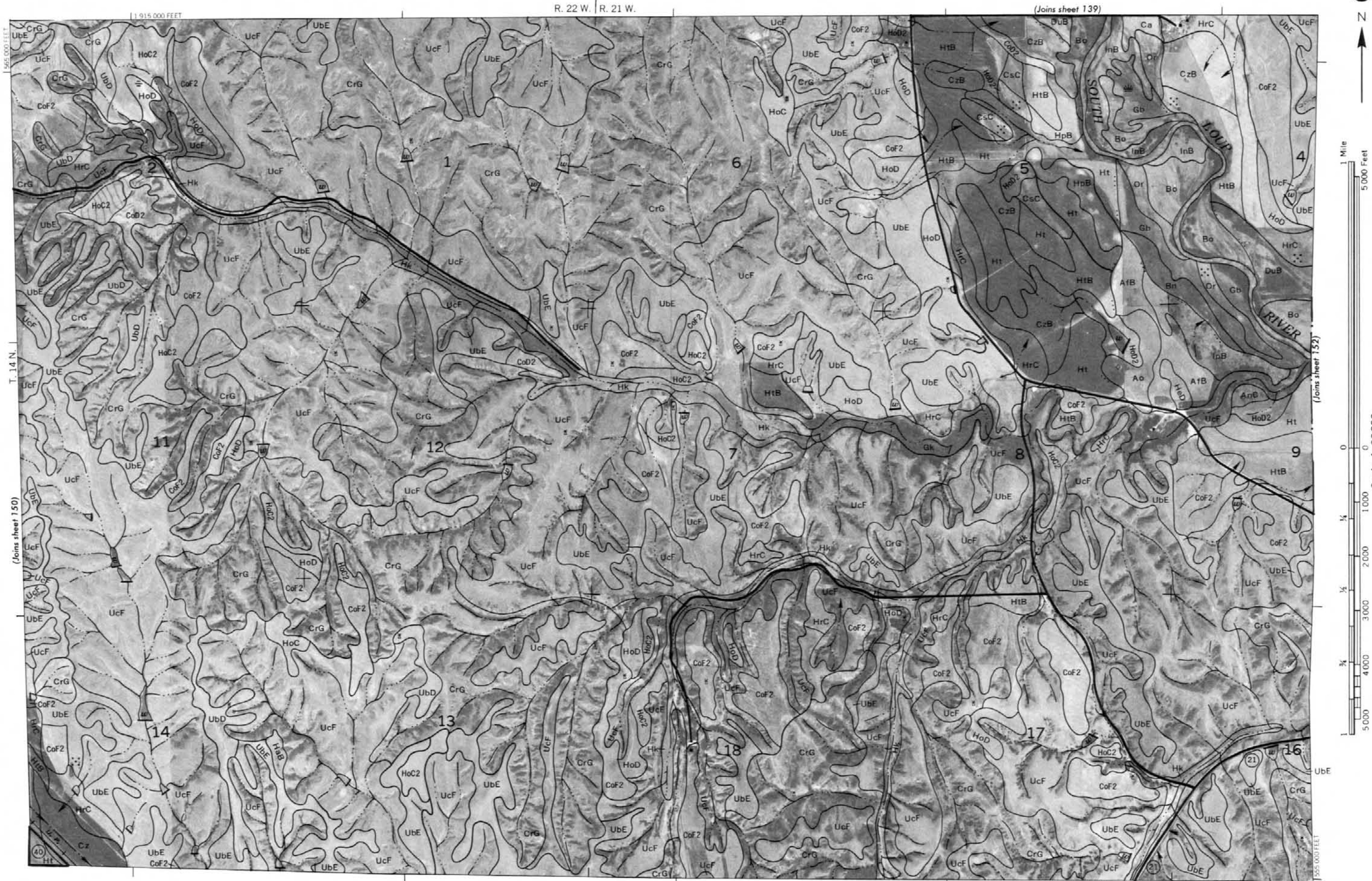

147
N
R. 25 W. | R. 24 W.
(Joins sheet 135)
(Joins sheet 148)
(Joins sheet 146)
(Joins sheet 160)
T. 14 N.
1 820 000 FEET
565 000 FEET
555 000 FEET
1 840 000 FEET
Stump Ditch
Sells Ditch
Schukar Table
Tallin Table
Pancake Valley
Stump Valley
1 Mile
5000 Feet
Scale 1:20000
0
¼
½
¾
1
1000
2000
3000
4000
5000

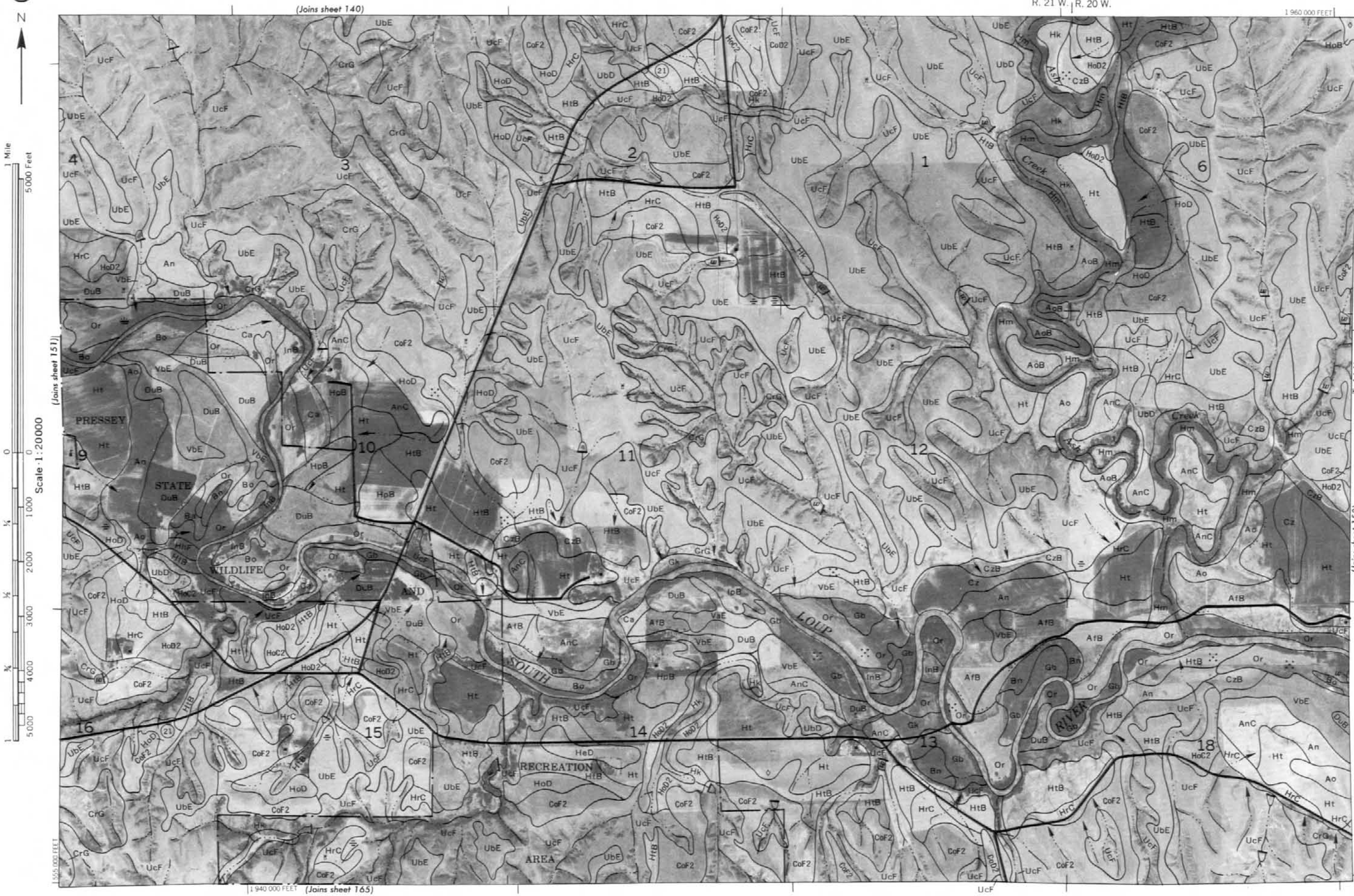

148
N
(Joins sheet 136)
R. 24 W. | R. 23 W.
1 865 000 FEET
565 000 FEET
T. 14 N.
(Joins sheet 149)
(Joins sheet 147)
555 000 FEET
1 845 000 FEET
(Joins sheet 161)
Scale 1:20000
1 Mile
5000 Feet
0
1000
2000
3000
4000
5000
Stop
Table
water
1
2
3
4
6
7
9
10
11
12
13
14
15
16
18


149
N
(Joins sheet 137)
(Joins sheet 148)
(Joins sheet 150)
(Joins sheet 162)
R. 23 W.
T. 14 N.
1 870 000 FEET
1 885 000 FEET
565 000 FEET
555 000 FEET
1 Mile
5000 Feet
Scale 1:20000
Cottonwood
Creek
Cottonwood
Creek
1
2
3
4
5
8
9
10
11
12
13
14
15
16
17
UcF
UbE
UbD
Hk
Hm
CrG
CoF2
HoB
HtB
HaB
Ha
HoC2
HoC
HoD
HoD2
HrB
HrC
GfC
CsC
Ks
Fm
HeD
Ht
CzB


150
N
R. 23 W.
R. 22 W.
(Joins sheet 138)
(Joins sheet 149)
(Joins sheet 151)
(Joins sheet 163)
T. 14 N.
1 910 000 FEET
565 000 FEET
555 000 FEET
1 890 000 FEET
1 Mile
5000 Feet
Scale 1:20000
LODI CEMETERY
Lodi
UNION
PACIFIC
Wood
River
40

CUSTER COUNTY, NEBRASKA — SHEET NUMBER 151

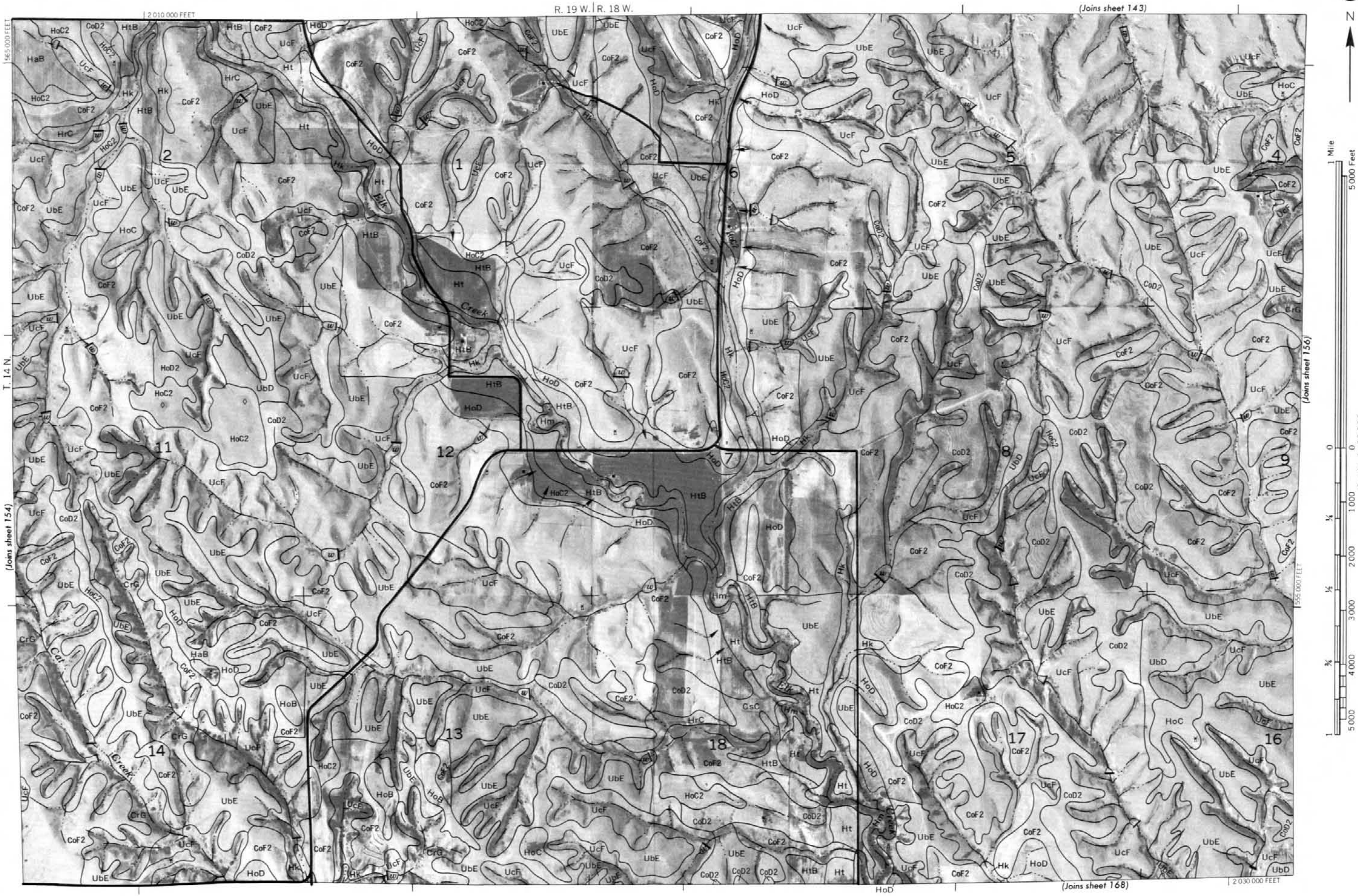


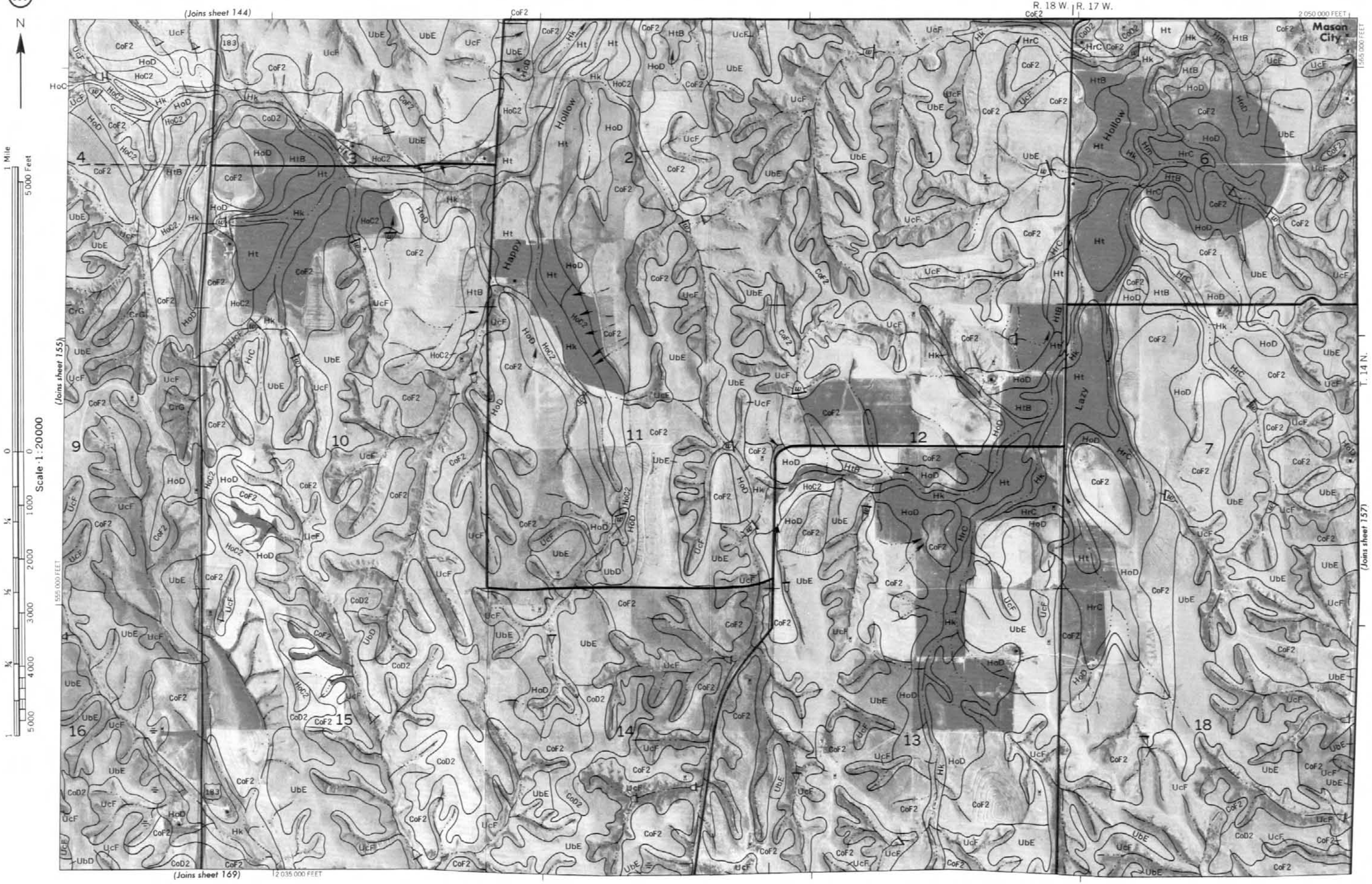

N
(Joins sheet 140)
R. 21 W. | R. 20 W.
1 960 000 FEET
565 000 FEET
(Joins sheet 151)
(Joins sheet 153)
T. 14 N.
(Joins sheet 165)
1 940 000 FEET
555 000 FEET
1 Mile
5 000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
¼
½
¾
1
PRESSEY
STATE
WILDLIFE
AND
RECREATION
AREA
SOUTH
LOUP
RIVER
Creek
Creek

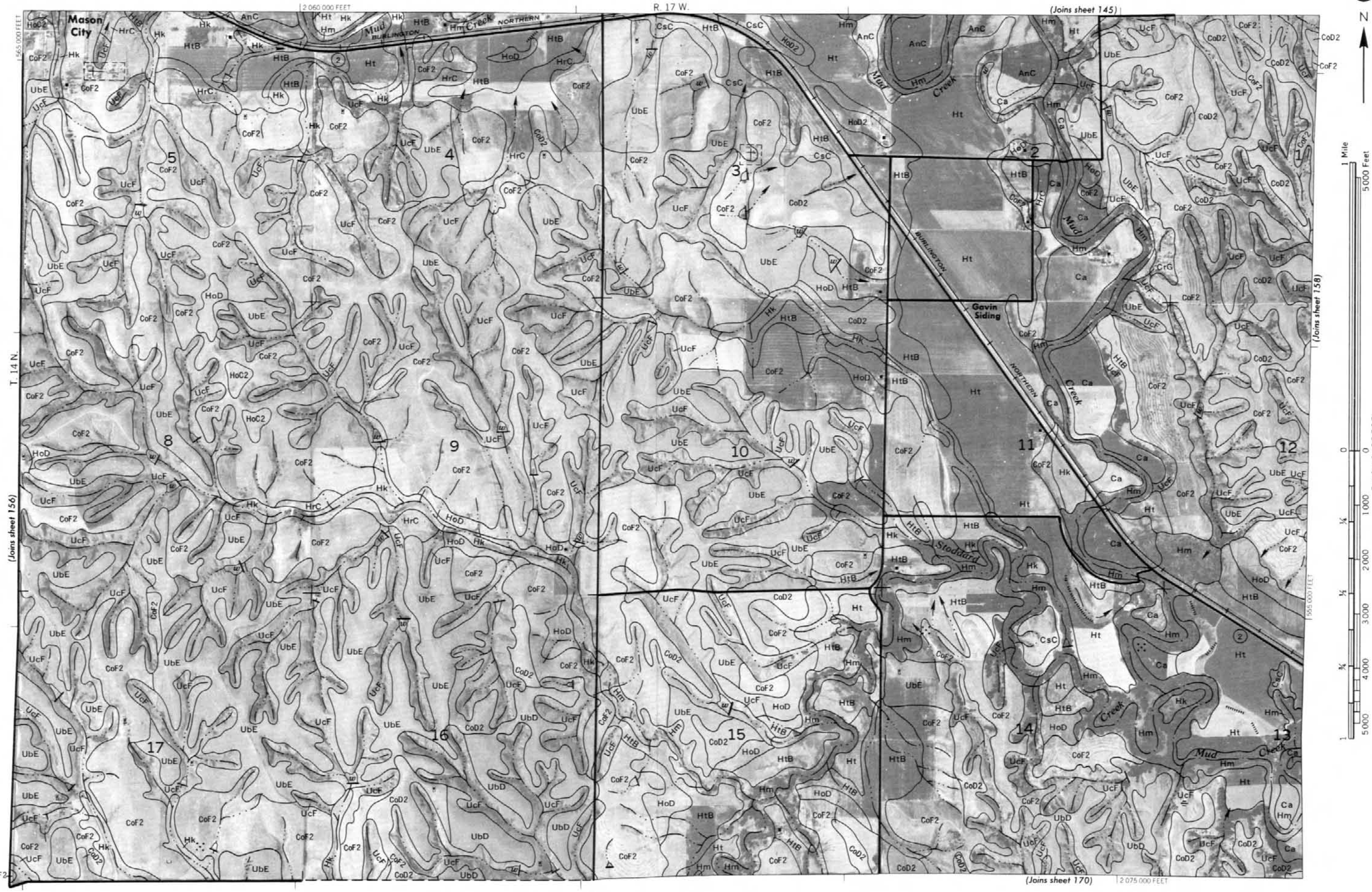
153

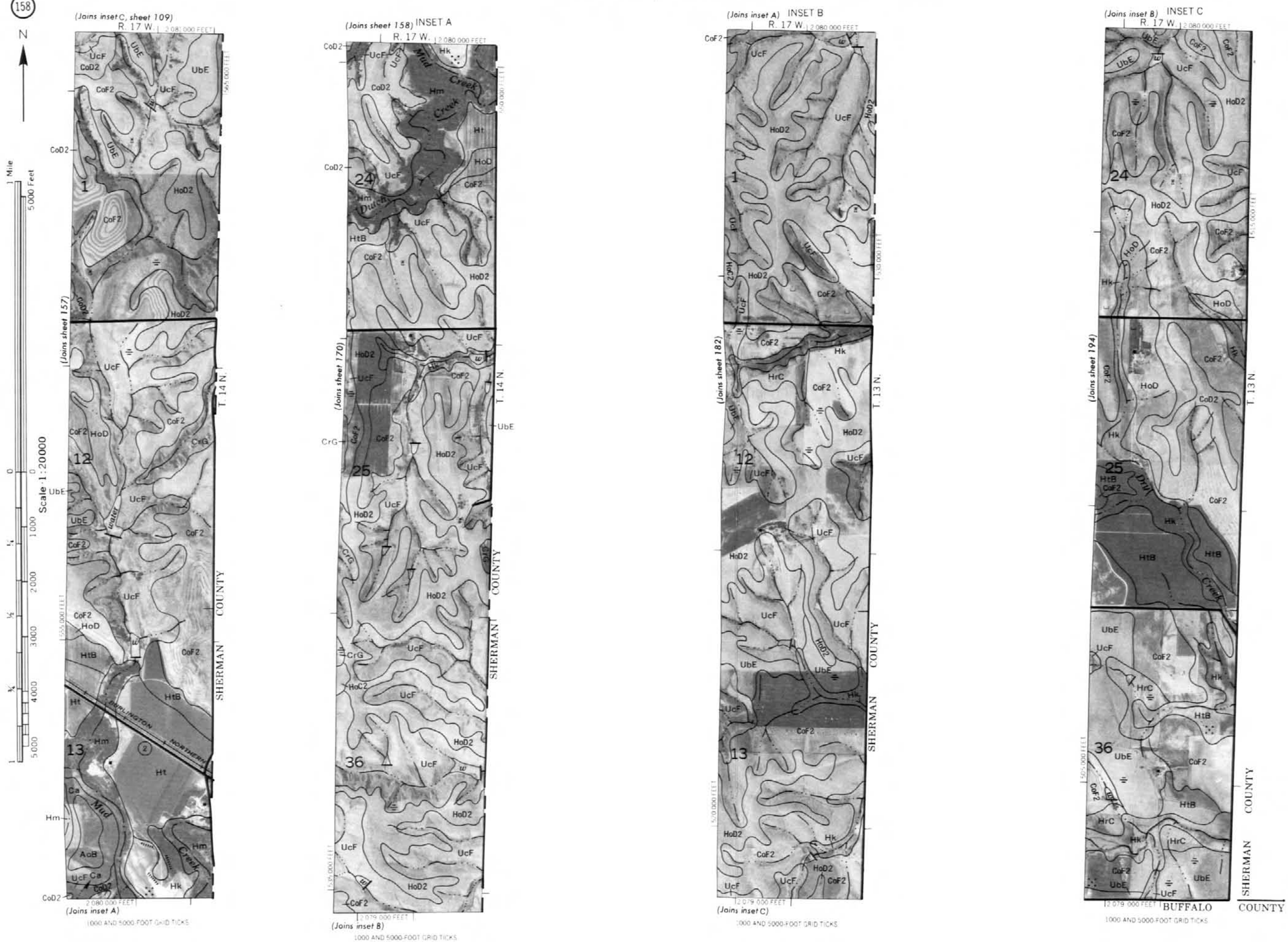

(Joins sheet 141)
R. 20 W.
1 965 000 FEET
565 000 FEET
T. 14 N.
(Joins sheet 152)
(Joins sheet 154)
(Joins sheet 166)
1 980 000 FEET
550 000 FEET
Buckeye
SOUTH
LOUP
RIVER
Deer
Creek
N
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
¼
½
¾
1


154
N
R. 20 W.
R. 19 W.
(Joins sheet 142)
(Joins sheet 153)
(Joins sheet 155)
(Joins sheet 167)
T. 14 N.
2 005 000 FEET
565 000 FEET
550 000 FEET
1 985 000 FEET
1 Mile
5000 Feet
Scale 1:20000
West Box Creek
Elder Creek
East Box Creek
Cat Creek
Deer Creek
1
3
4
5
6
7
8
9
10
12
13
15
16
17
18


2 010 000 FEET
R. 19 W. | R. 18 W.
(Joins sheet 143)
565 000 FEET
T. 14 N.
(Joins sheet 154)
(Joins sheet 156)
555 000 FEET
(Joins sheet 168)
2 030 000 FEET
N
1 Mile
5000 Feet
Scale 1:20000
Elk Creek
Cat Creek
1
2
4
5
6
7
8
9
11
12
13
14
16
17
18


N
(Joins sheet 144)
(Joins sheet 155)
(Joins sheet 157)
(Joins sheet 169)
R. 18 W. | R. 17 W.
T. 14 N.
2 050 000 FEET
555 000 FEET
2 035 000 FEET
Mason City
Happy Hollow
Hollow
Lazy
183
1 Mile
5000 Feet
Scale 1:20000
1
2
3
4
6
7
9
10
11
12
13
14
15
16
18

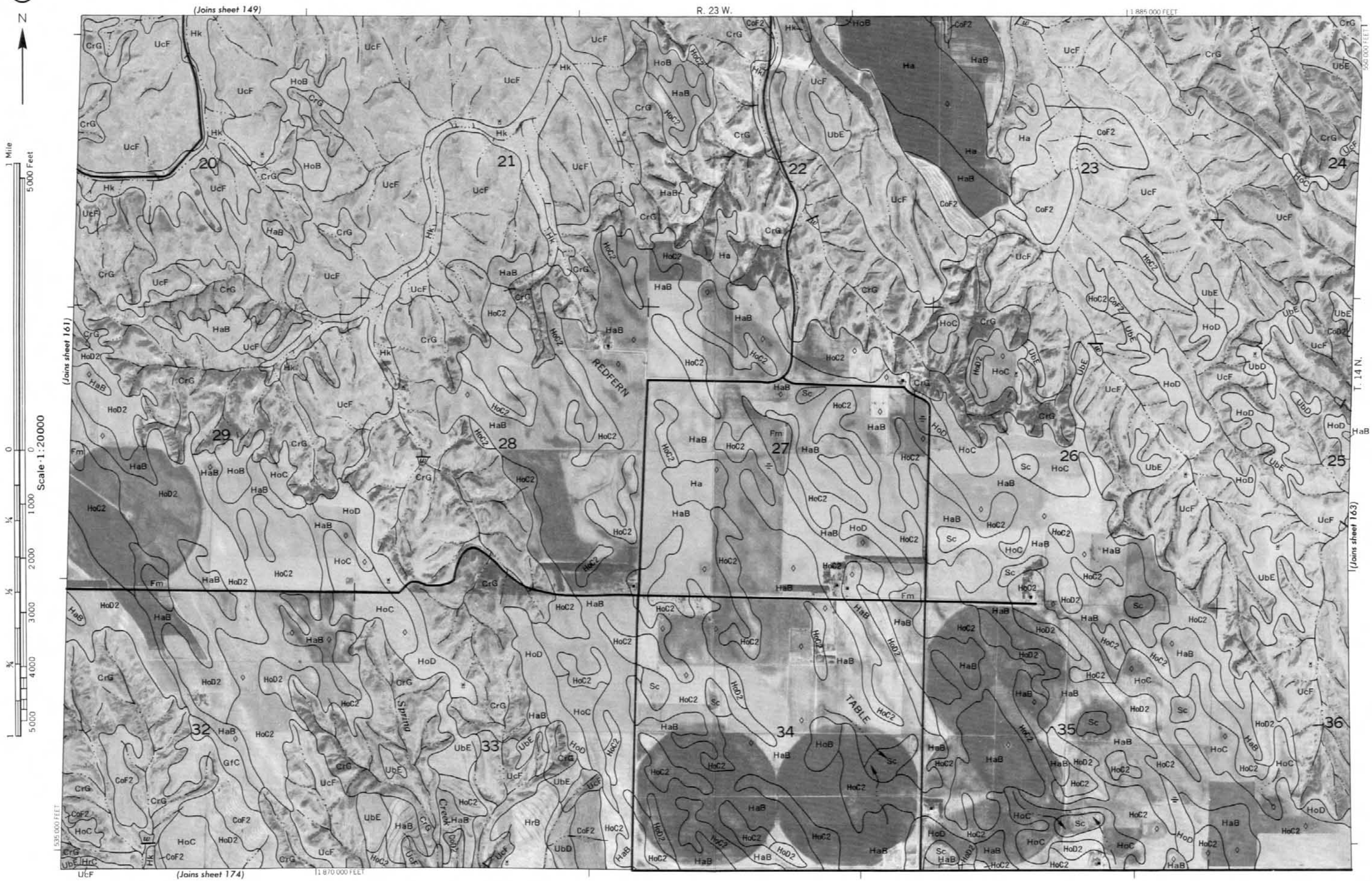

(Joins sheet 145)
R. 17 W.
2 060 000 FEET
565 000 FEET
T. 14 N.
Mason City
Mud Creek
BURLINGTON NORTHERN
Gavin Siding
Stoddard
(Joins sheet 158)
(Joins sheet 156)
(Joins sheet 170)
2 075 000 FEET
N
1 Mile
5000 Feet
Scale 1:20000
1
2
3
4
5
8
9
10
11
12
13
14
15
16
17

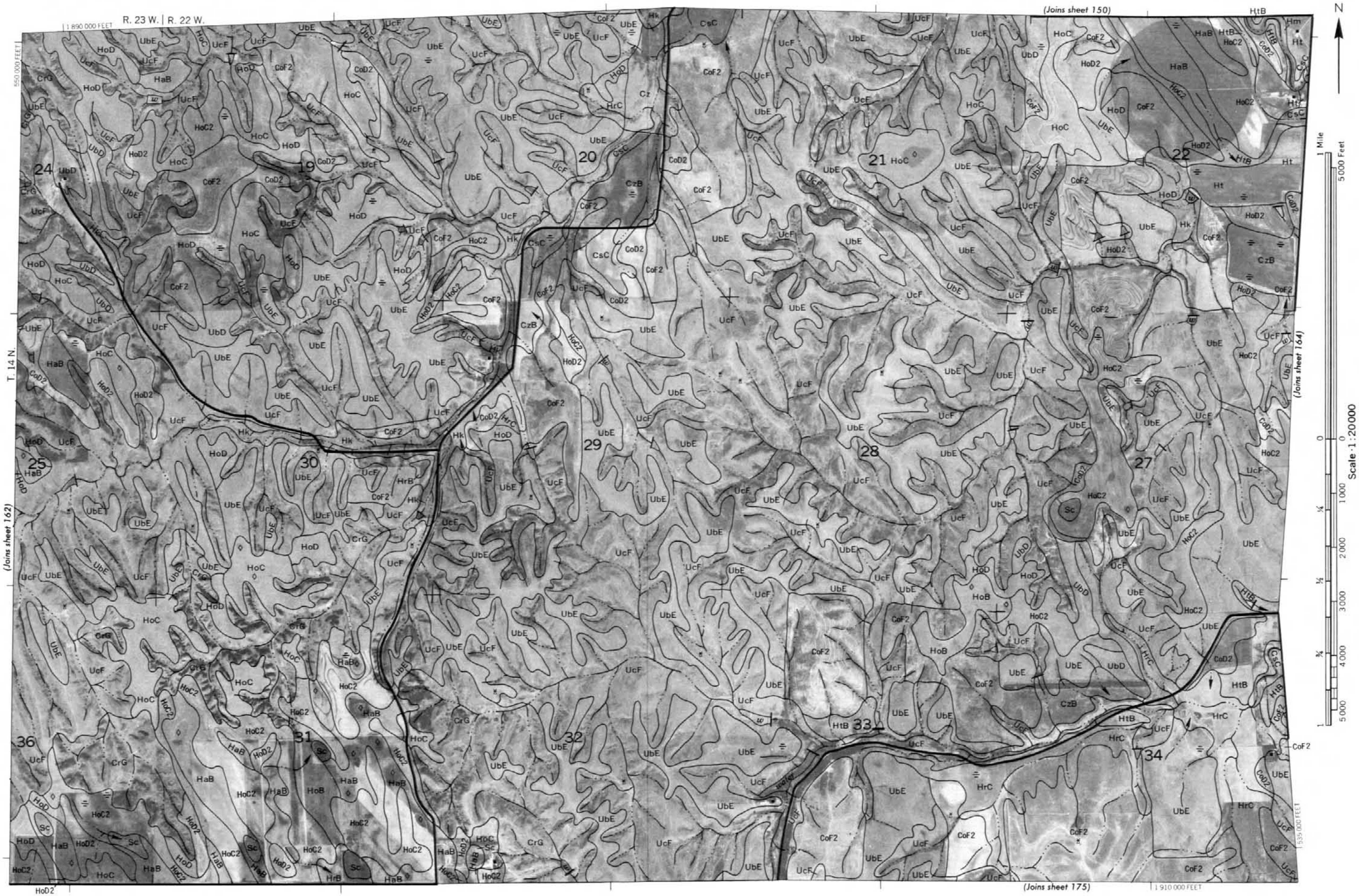

158
N
Scale 1:20000
1 Mile
5000 Feet
(Joins inset C, sheet 109)
R. 17 W.
(Joins sheet 157)
T. 14 N.
SHERMAN COUNTY
BURLINGTON NORTHERN
Mud Creek
(Joins inset A)
1000 AND 5000-FOOT GRID TICKS
(Joins sheet 158) INSET A
(Joins sheet 170)
Dutch
(Joins inset B)
(Joins inset A) INSET B
(Joins sheet 182)
T. 13 N.
(Joins inset C)
(Joins inset B) INSET C
(Joins sheet 194)
Dry Creek
BUFFALO COUNTY


R. 25 W.
(Joins sheet 146)
1 800 000 FEET
T. 14 N.
LINCOLN COUNTY
(Joins sheet 160)
(Joins sheet 171)
1 815 000 FEET
535 000 FEET
N
19
20
21
22
27
28
29
30
31
32
33
34
Odencranze
Cottonwood
West
Buffalo
Creek
Valley
Table
Landing strip
47
HaB
HoC
HoC2
HoD
HoD2
Sc
Hk
UcF
CrG
UbE
UbD
GfE
GfF
VbE
HeB
HeC
HeD
HhF
CzB
CsC
CoF2
Hm
HrB
Scale 1:20000
1 Mile
5000 Feet
0
1000
2000
3000
4000
5000

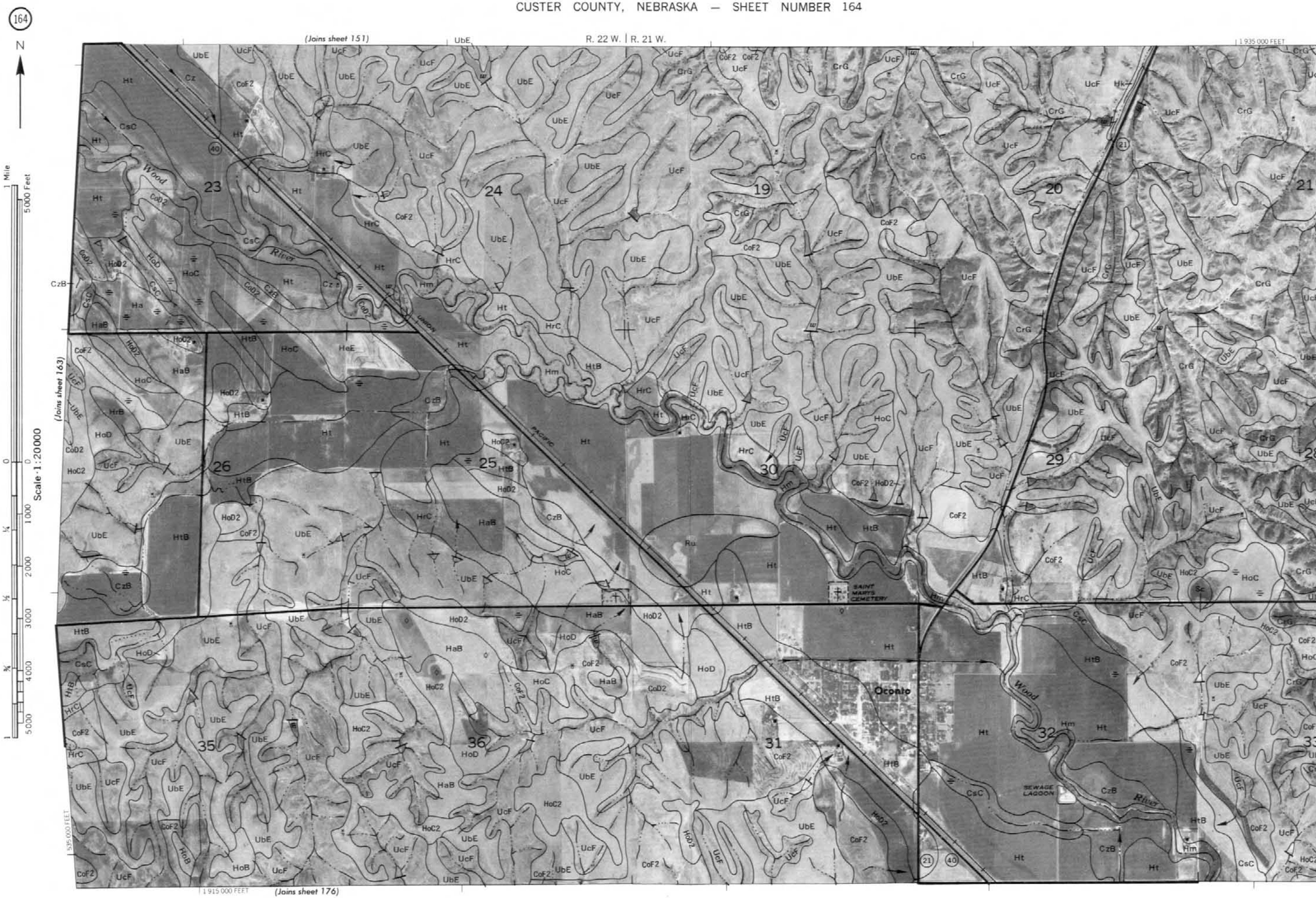

160
N
(Joins sheet 147)
R. 25 W. | R. 24 W.
1 840 000 FEET
550 000 FEET
(Joins sheet 159)
(Joins sheet 161)
(Joins sheet 172)
T. 14 N.
1 Mile
5000 Feet
Scale 1:20000
1 820 000 FEET
535 000 FEET
Pancake Valley
Buffalo Creek
East Buffalo Creek
West Buffalo Creek
Rock Island
Table
Sells Valley Ditch
Stump
SELLS VALLEY CEMETERY
Valley
Etna
19
20
21
23
24
25
26
28
29
30
31
32
33
35
36


161
N
R. 24 W. | R. 23 W.
(Joins sheet 148)
(Joins sheet 162)
(Joins sheet 173)
(Joins sheet 160)
T. 14 N.
1 845 000 FEET
1 865 000 FEET
550 000 FEET
535 000 FEET
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
0
¼
½
¾
1
Roten
Hansen
Table
Stump
Sells
Ditch
Valley
water
19
21
22
23
24
25
26
27
28
30
31
33
34
35
36

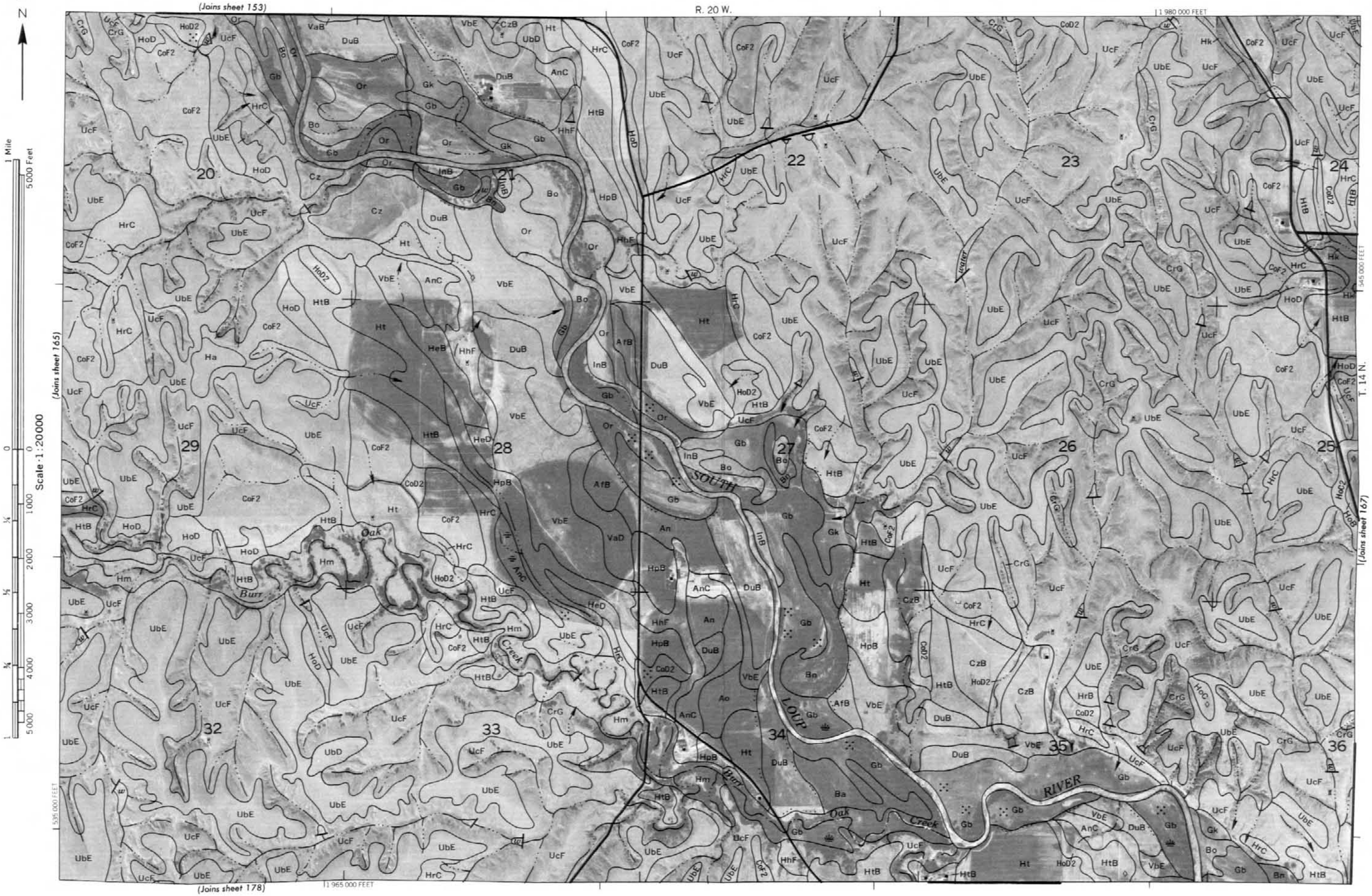

(Joins sheet 149)
R. 23 W.
1 885 000 FEET
550 000 FEET
T. 14 N.
(Joins sheet 161)
(Joins sheet 163)
(Joins sheet 174)
535 000 FEET
1 870 000 FEET
N
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
¼
½
¾
1
20
21
22
23
24
29
28
27
26
25
32
33
34
35
36
REDFERN
TABLE
Spring
Creek
UcF
CrG
Hk
HoB
HaB
Ha
CoF2
UbE
HoC2
HoD2
HoC
HoD
Sc
Fm
UbD
GfC
HrB
UcF
HrC


R. 23 W.
R. 22 W.
1 890 000 FEET
550 000 FEET
T. 14 N.
(Joins sheet 150)
(Joins sheet 164)
(Joins sheet 175)
(Joins sheet 162)
1 910 000 FEET
535 000 FEET
N
1 Mile
5000 Feet
Scale 1:20000
19
20
21
22
24
25
27
28
29
30
31
32
33
34
36

CUSTER COUNTY, NEBRASKA — SHEET NUMBER 164

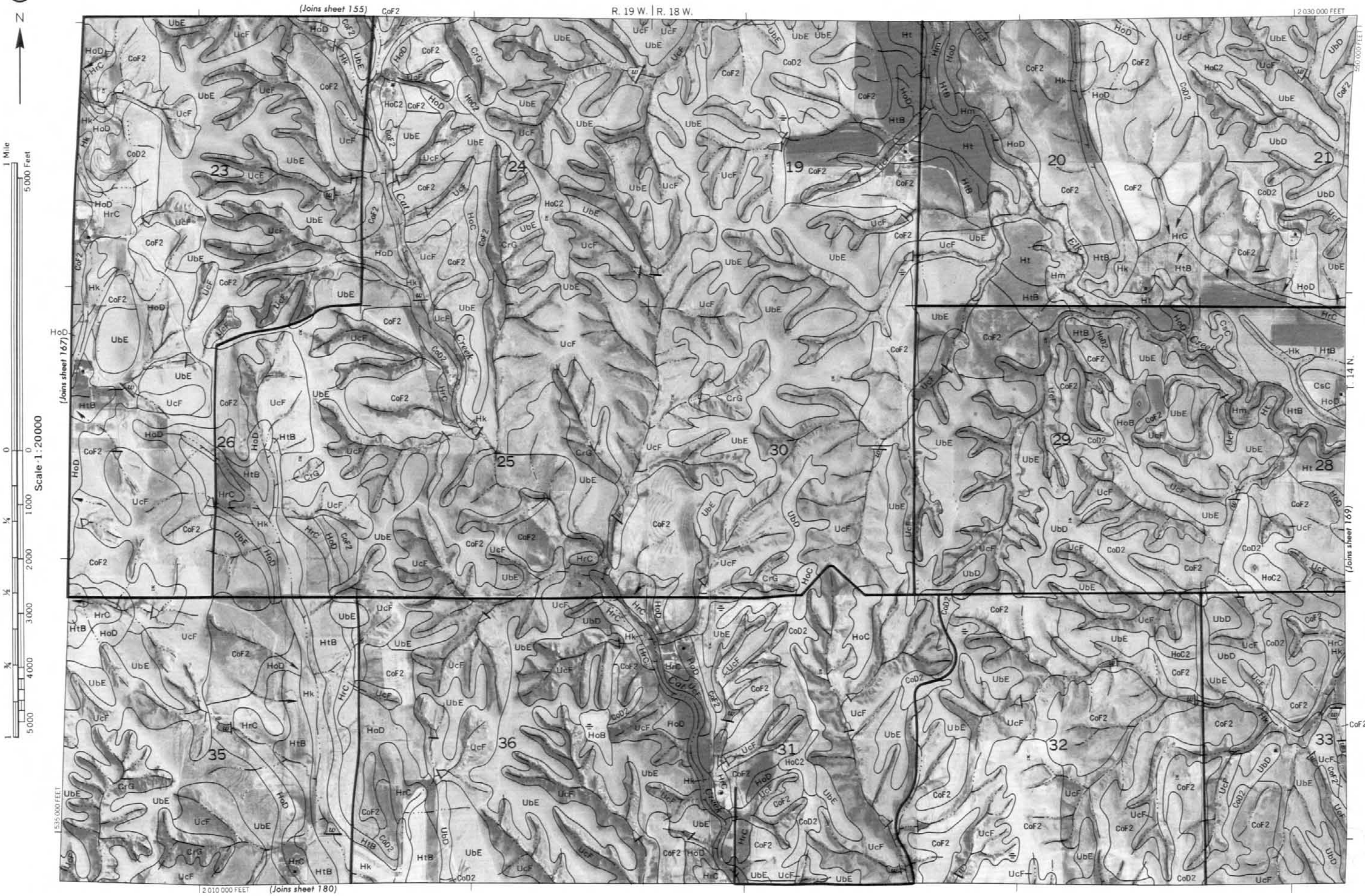


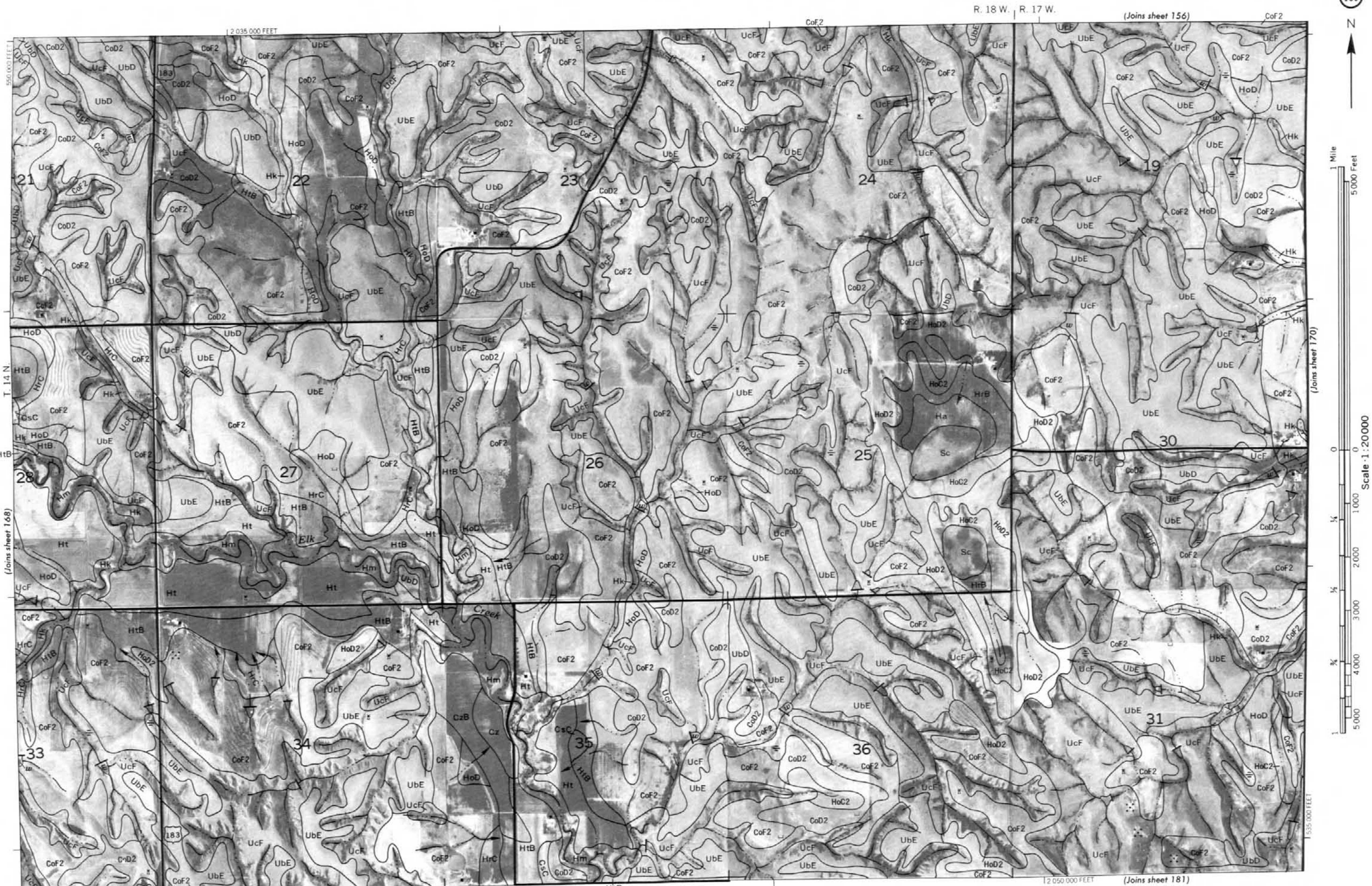

1 940 000 FEET
R. 21 W. | R. 20 W.
(Joins sheet 152)
N
T. 14 N
545 000 FEET
(Joins sheet 164)
(Joins sheet 166)
(Joins sheet 177)
1 960 000 FEET
535 000 FEET
PRESSEY
STATE
WILDLIFE
AND
RECREATION
AREA
Oak
Creek
Burr
19
21
22
23
24
25
26
27
28
30
31
33
34
35
36
1 Mile
5000 Feet
Scale 1:20000
0
¼
½
¾
1
0
1000
2000
3000
4000
5000

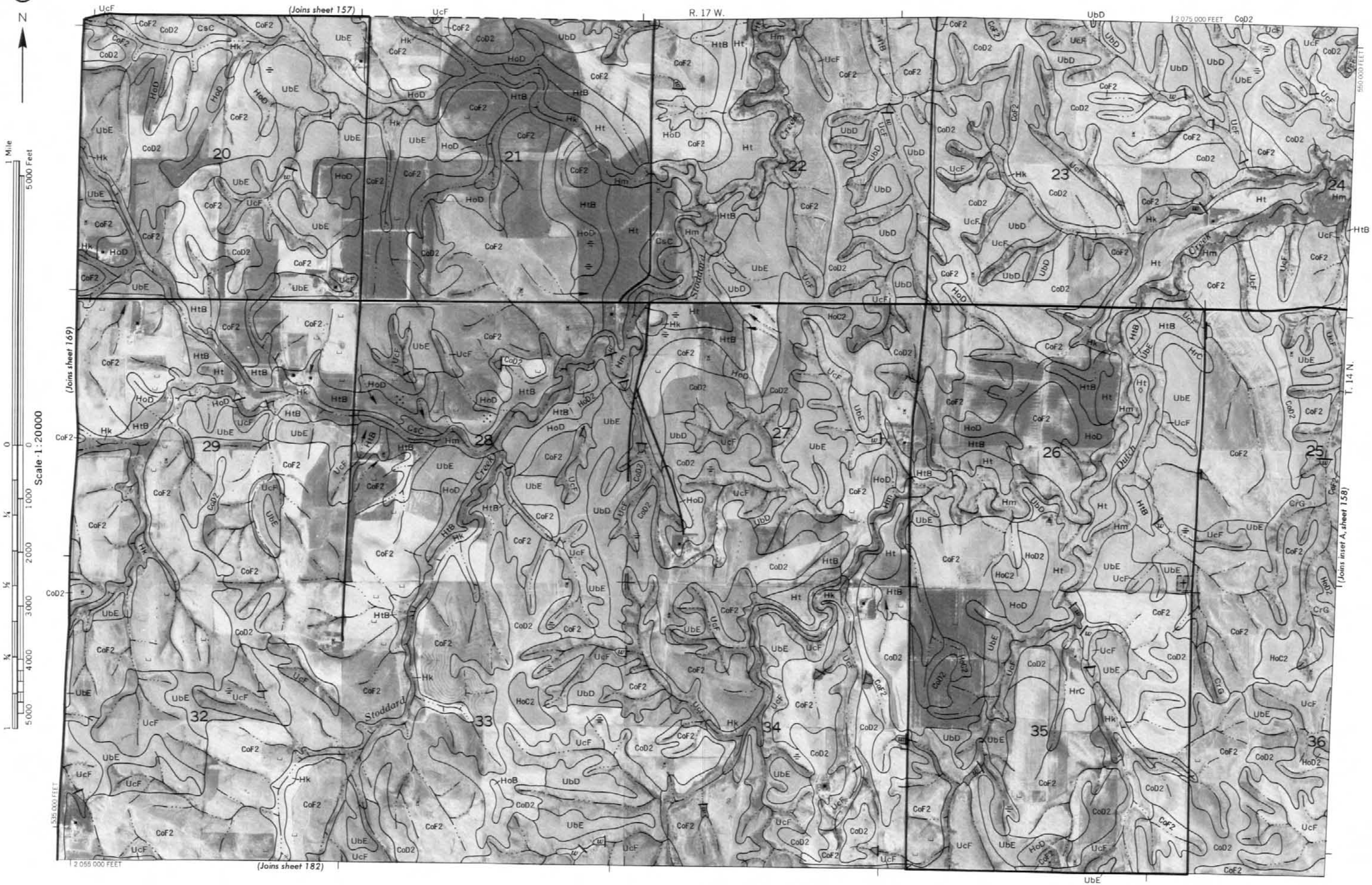

N
1 Mile
5000 Feet
Scale 1:20000
(Joins sheet 153)
R. 20 W.
1 980 000 FEET
(Joins sheet 165)
(Joins sheet 167)
T. 14 N.
545 000 FEET
535 000 FEET
(Joins sheet 178)
1 965 000 FEET
SOUTH
LOUP
RIVER
Burr
Oak
Creek
20
21
22
23
24
25
26
27
28
29
32
33
34
35
36

CUSTER COUNTY, NEBRASKA — SHEET NUMBER 167

168

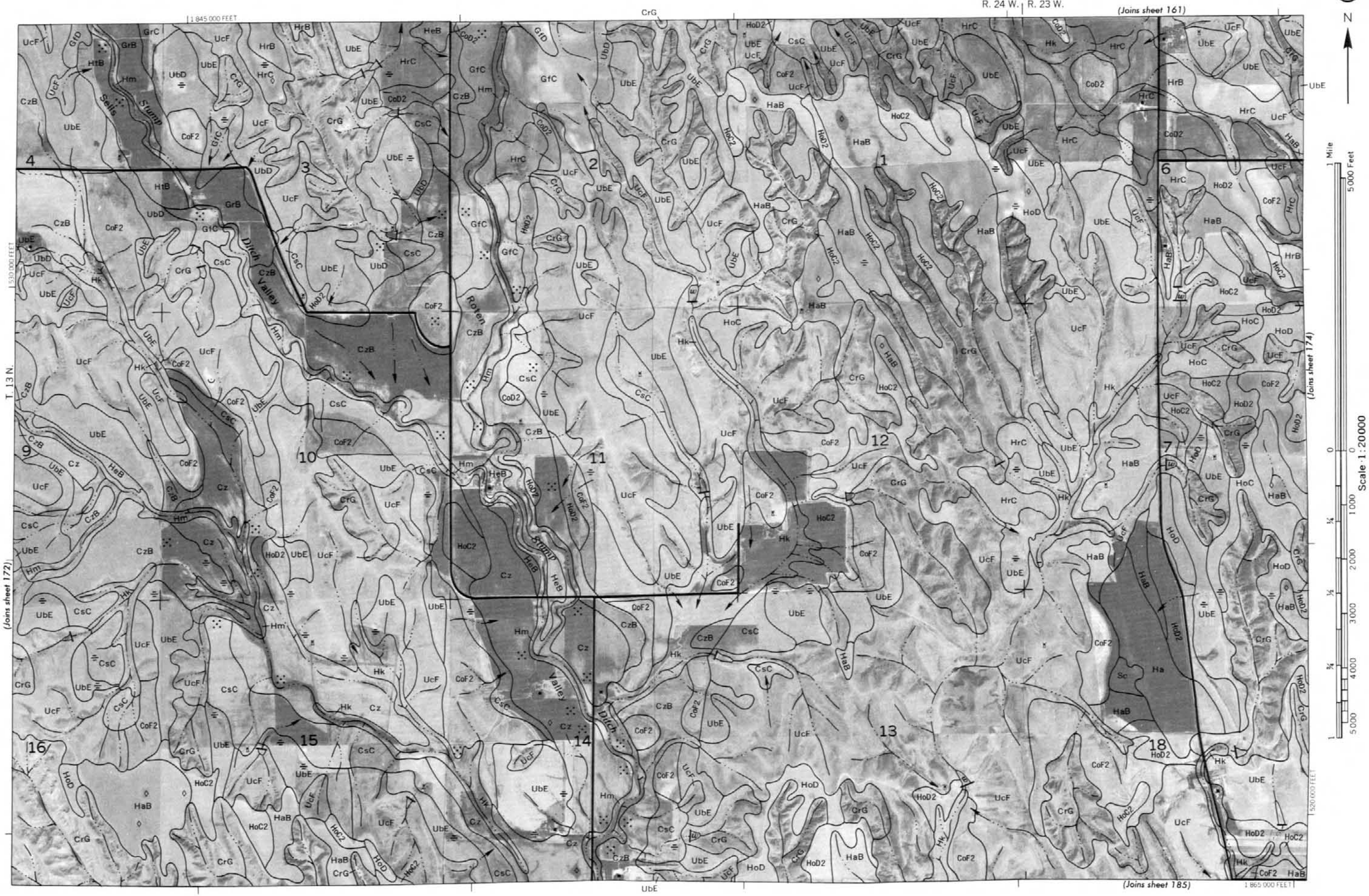

N
(Joins sheet 155)
R. 19 W. | R. 18 W.
2 030 000 FEET
550 000 FEET
(Joins sheet 167)
(Joins sheet 169)
(Joins sheet 180)
2 010 000 FEET
535 000 FEET
T. 14 N.
1 Mile
5000 Feet
Scale 1:20000
23
24
19
20
21
26
25
30
29
28
35
36
31
32
33
Cat Creek
Elk Creek
Creek


R. 18 W.
R. 17 W.
(Joins sheet 156)
(Joins sheet 170)
(Joins sheet 181)
(Joins sheet 168)
T. 14 N.
2 035 000 FEET
2 050 000 FEET
550 000 FEET
535 000 FEET
N
21
22
23
24
19
28
27
26
25
30
33
34
35
36
31
Elk
Creek
183
1 Mile
5000 Feet
Scale 1:20000

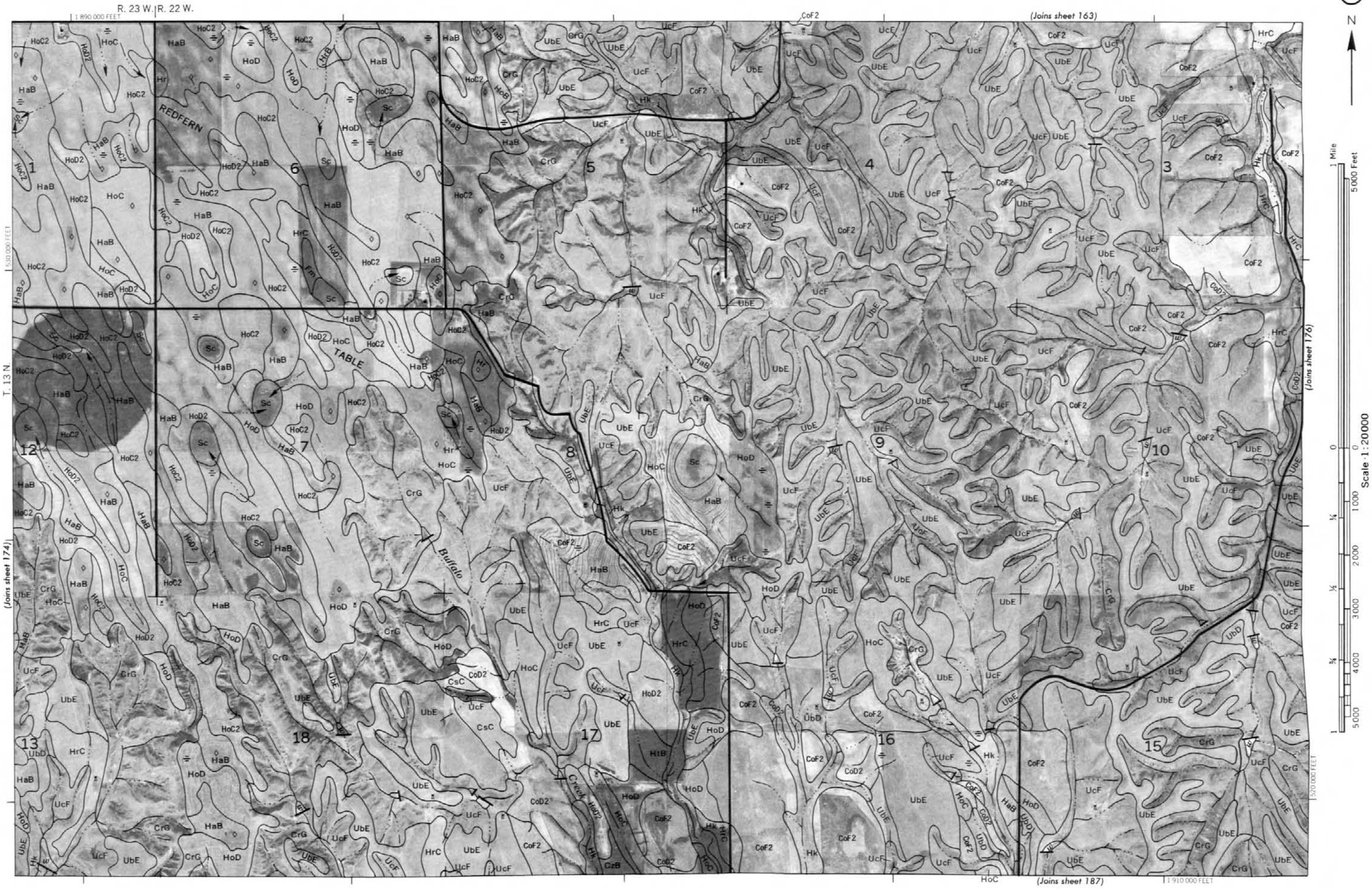

N
(Joins sheet 157)
R. 17 W.
2 075 000 FEET
550 000 FEET
T. 14 N.
(Joins inset A, sheet 158)
(Joins sheet 169)
(Joins sheet 182)
2 055 000 FEET
535 000 FEET
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
¼
½
¾
1
20
21
22
23
24
25
26
27
28
29
32
33
34
35
36
Stoddard
Creek
Dutch

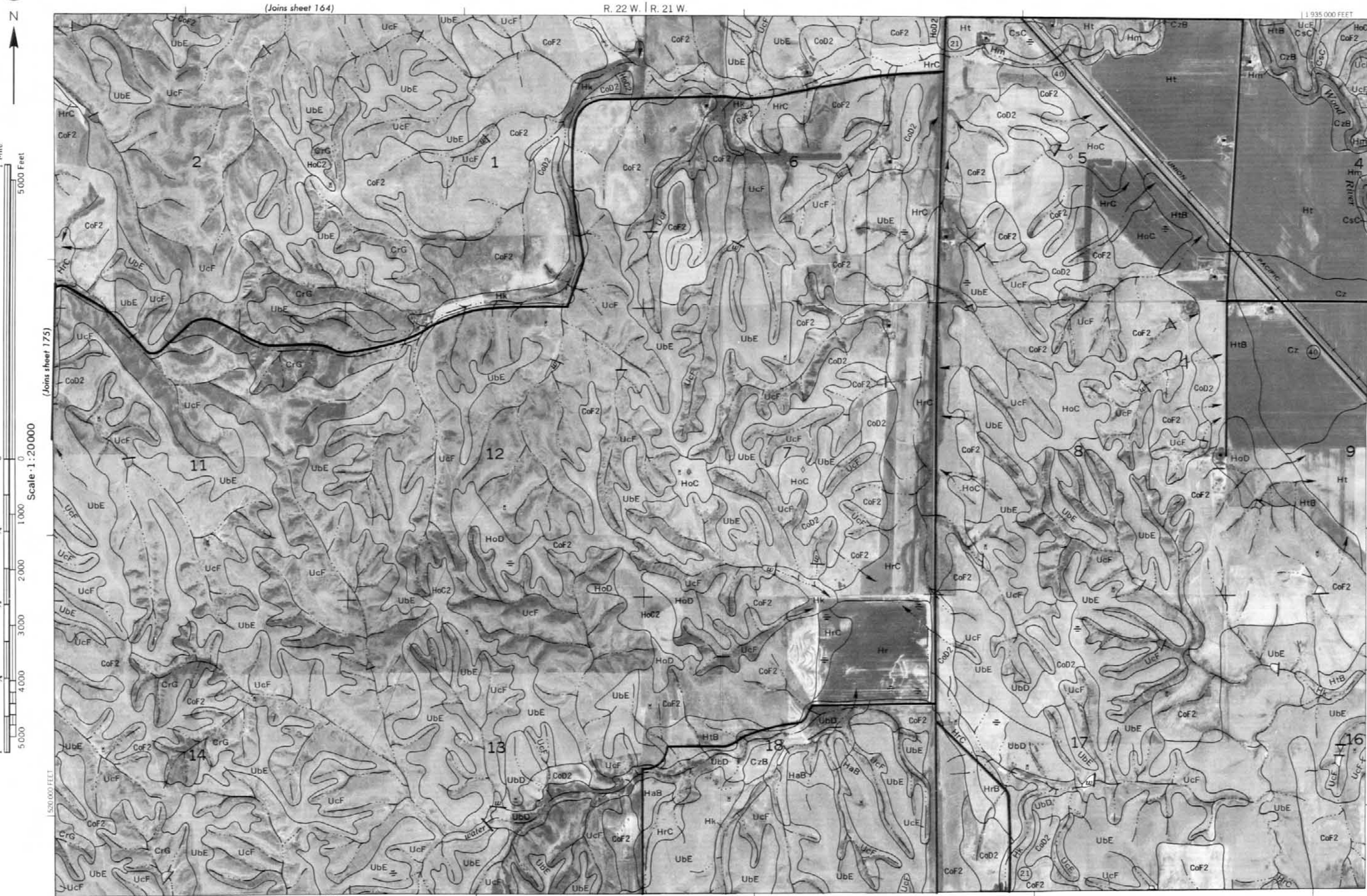

171
N
1 800 000 FEET
R. 25 W.
(Joins sheet 159)
T. 13 N.
530 000 FEET
(Joins sheet 172)
LINCOLN COUNTY
Odencranze
Table
47
3
4
5
6
7
8
9
10
15
16
17
18
520 000 FEET
(Joins sheet 183)
1 815 000 FEET
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
¼
½
¾
1

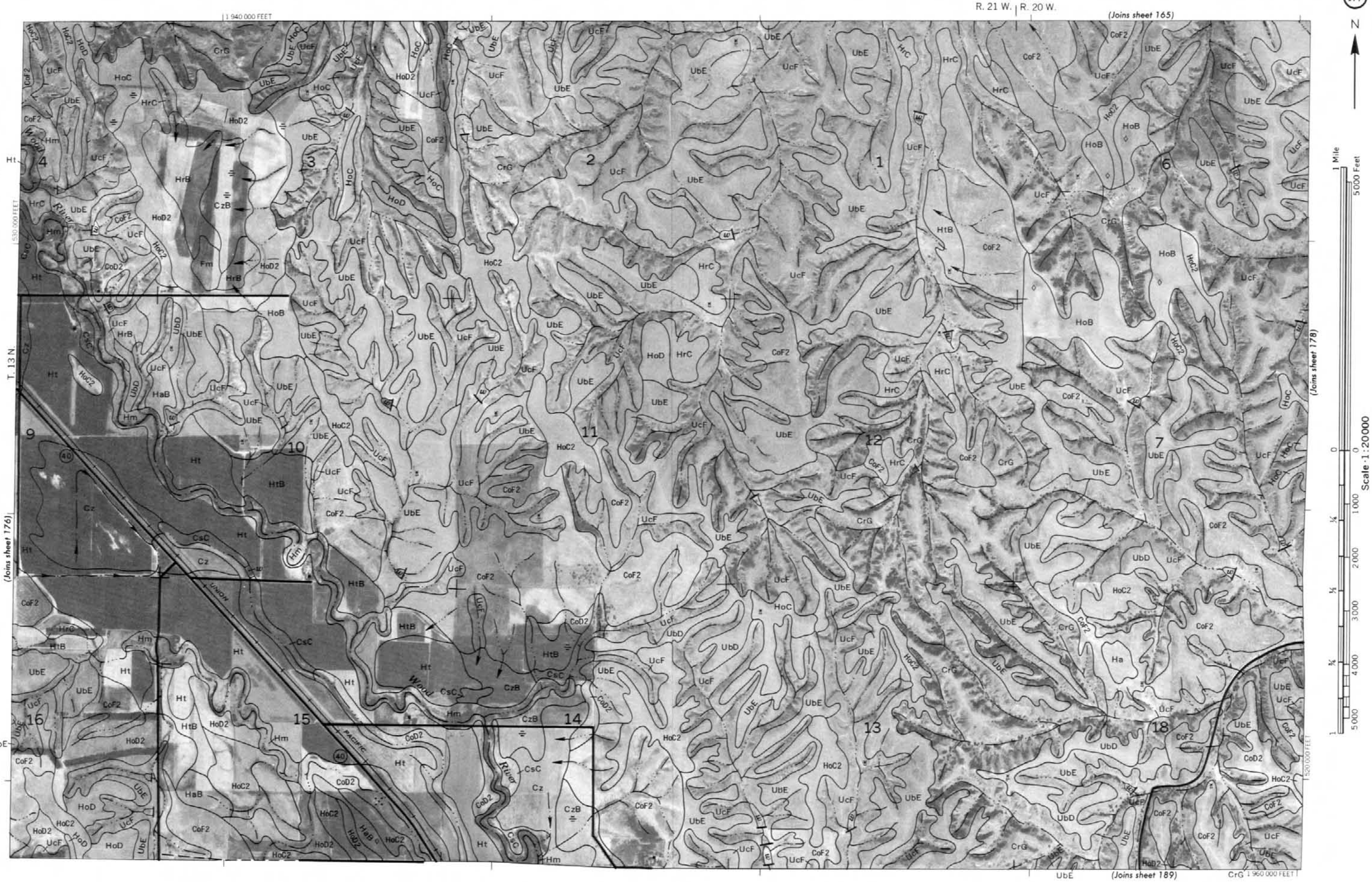

172
N
(Joins sheet 160)
R. 25 W. | R. 24 W.
1 840 000 FEET
530 000 FEET
T. 13 N.
(Joins sheet 173)
(Joins sheet 171)
(Joins sheet 184)
520 000 FEET
1 820 000 FEET
Cottonwood
Buffalo
Creek
Valley
Rock
Island
Table
Scale 1:20000
1 Mile
5000 Feet
0
1000
2000
3000
4000
5000
¼
½
¾
1
2
3
4
5
6
7
8
9
11
12
13
14
16
17
18


R. 24 W. | R. 23 W.
(Joins sheet 161)
(Joins sheet 174)
(Joins sheet 185)
(Joins sheet 172)
T. 13 N.
1 845 000 FEET
1 865 000 FEET
530 000 FEET
520 000 FEET
N
Sells
Stump
Ditch
Valley
Roten
Stump
Valley
Ditch
1
2
3
4
6
7
9
10
11
12
13
14
15
16
18
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
0
¼
½
¾
1


N
(Joins sheet 162)
R. 23 W.
1 885 000 FEET
530 000 FEET
T. 13 N.
(Joins sheet 173)
(Joins sheet 175)
(Joins sheet 186)
1 870 000 FEET
520 000 FEET
1 Mile
5000 Feet
Scale 1:20000
REDFERN
TABLE
Spring
Creek
West
Buffalo
Creek
1
2
3
4
5
8
9
10
11
12
13
14
15
16
17

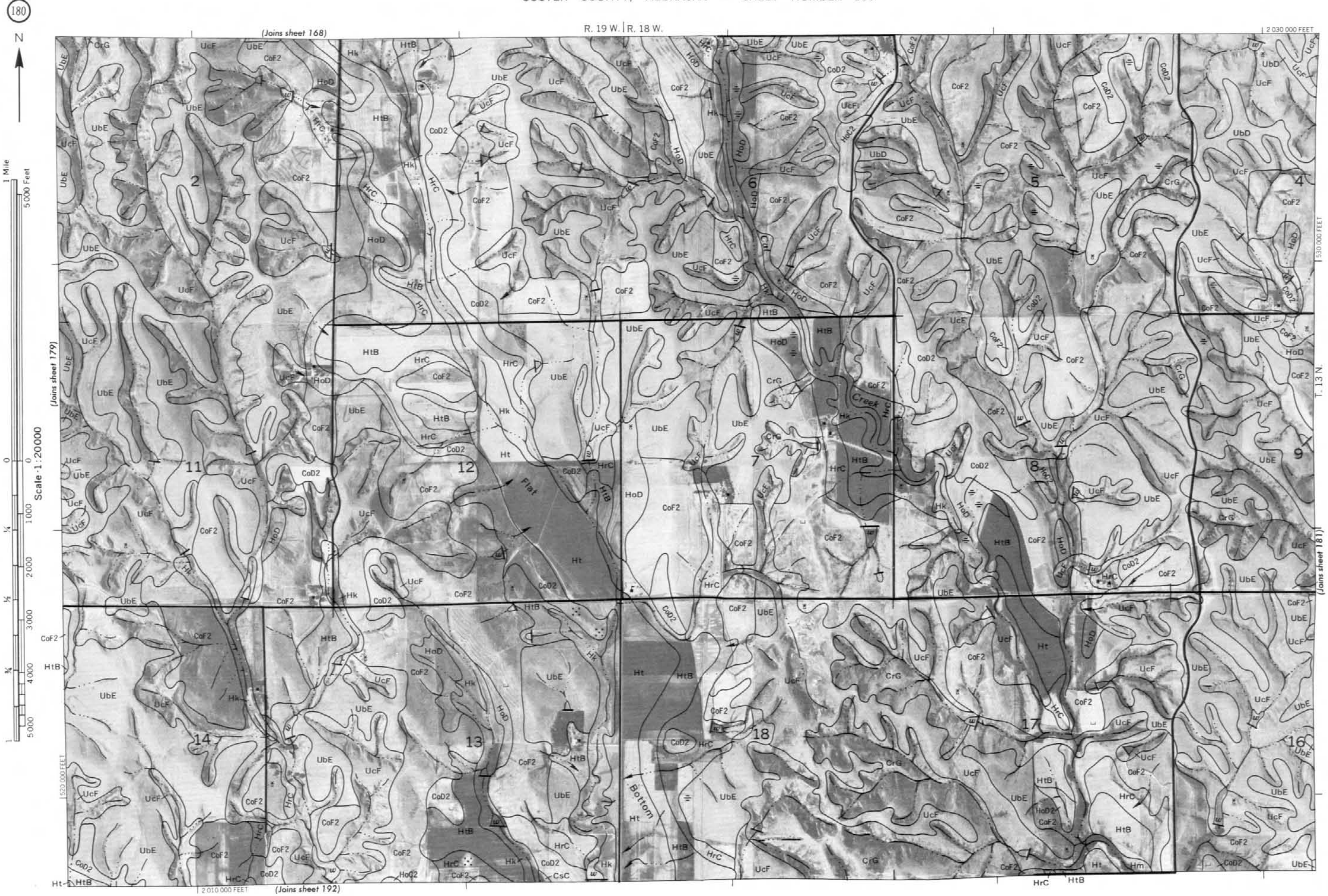

R. 23 W.
R. 22 W.
1 890 000 FEET
(Joins sheet 163)
(Joins sheet 176)
(Joins sheet 187)
(Joins sheet 174)
T. 13 N.
530 000 FEET
520 000 FEET
1 910 000 FEET
N
REDFERN
TABLE
Buffalo
Creek
1
3
4
5
6
7
8
9
10
12
13
15
16
17
18
1 Mile
5000 Feet
Scale 1:20000
0
¼
½
¾
1
1000
2000
3000
4000
5000

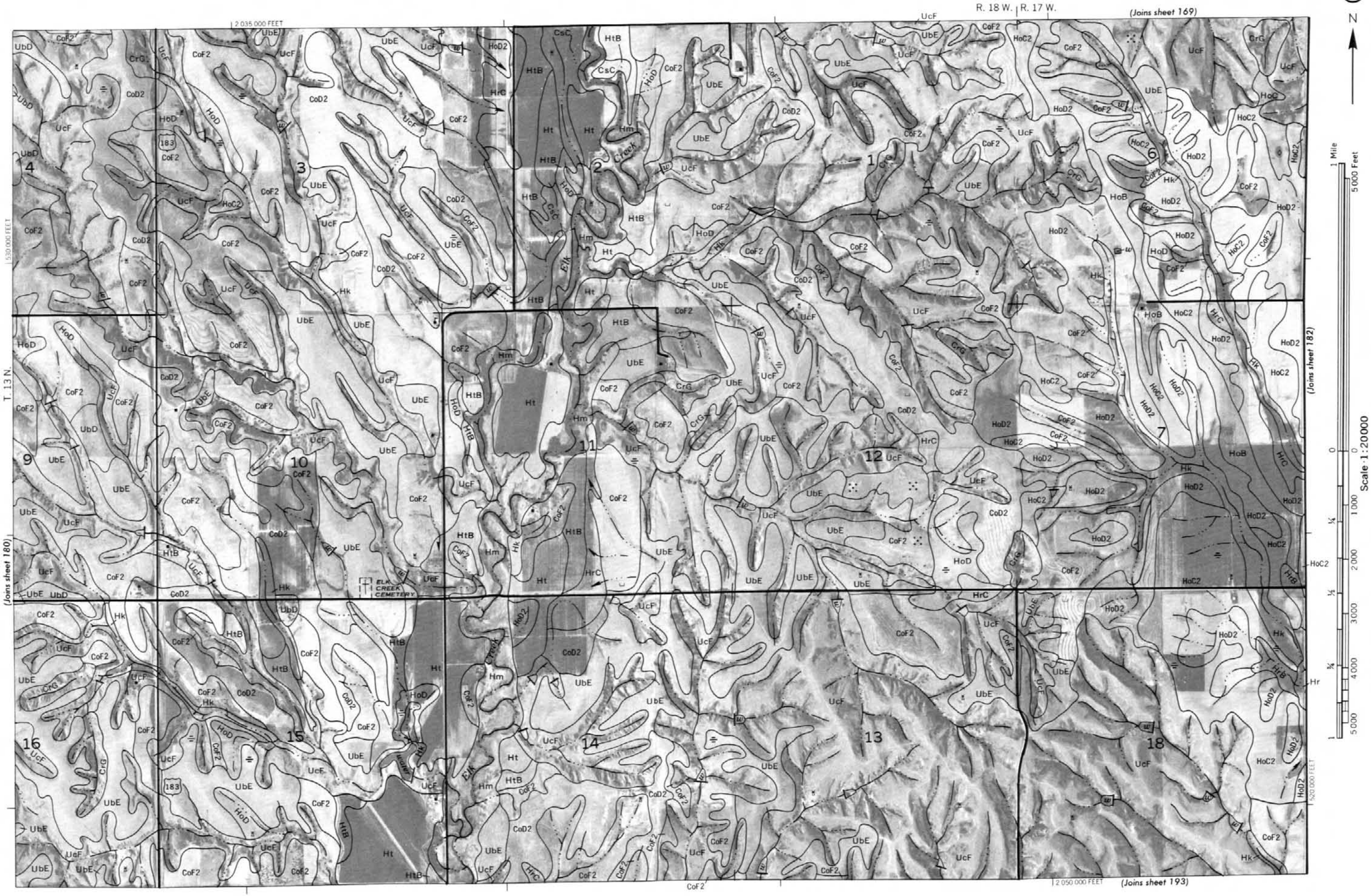

N
(Joins sheet 164)
R. 22 W. | R. 21 W.
1 935 000 FEET
(Joins sheet 175)
(Joins sheet 177)
(Joins sheet 188)
1 915 000 FEET
520 000 FEET
530 000 FEET
T. 13 N.
Scale 1:20000
1 Mile
5000 Feet
UNION
PACIFIC
Wood
River
Water

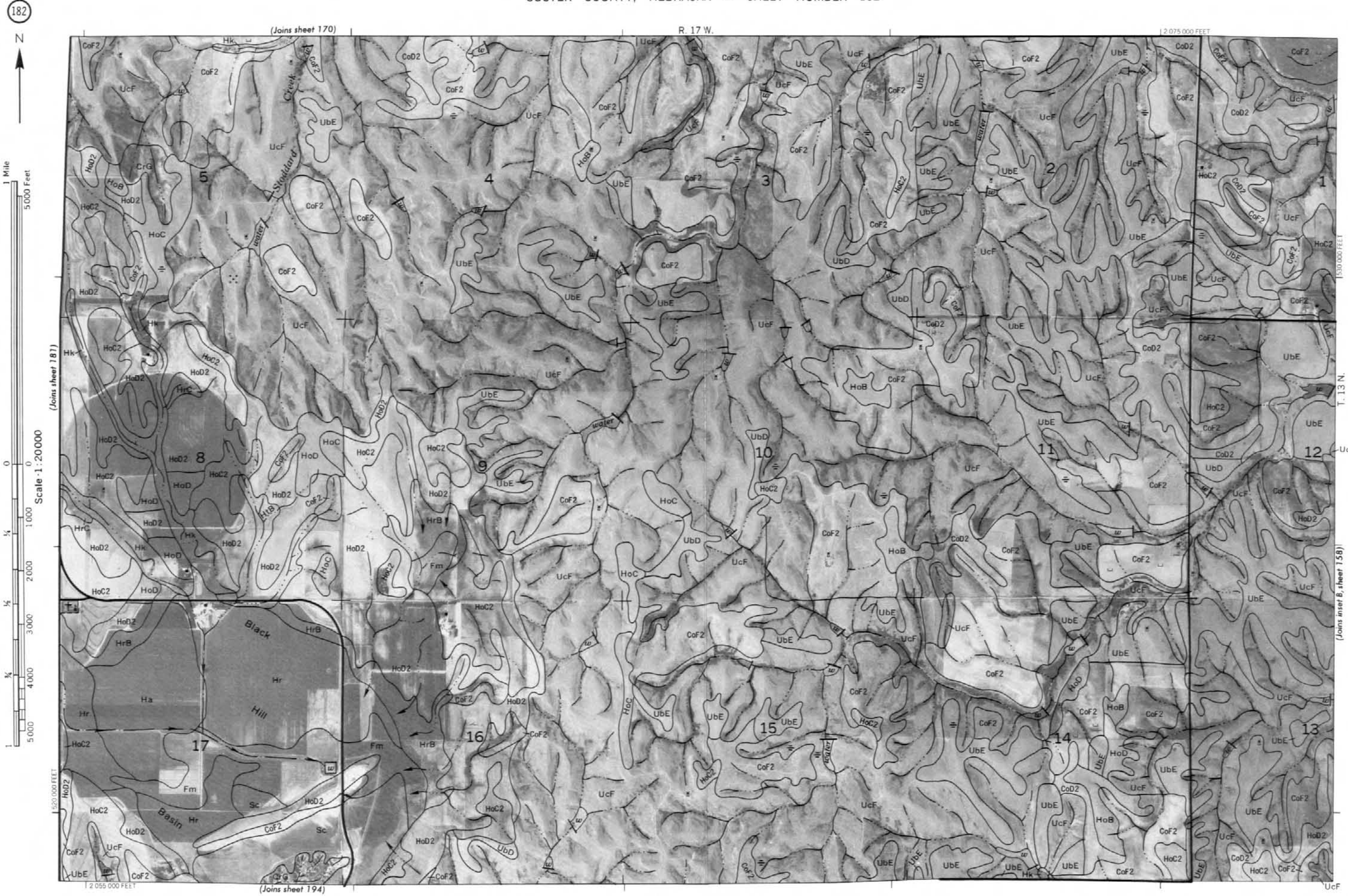

177
N
1 940 000 FEET
R. 21 W.
R. 20 W.
(Joins sheet 165)
(Joins sheet 178)
(Joins sheet 176)
(Joins sheet 189)
1 960 000 FEET
530 000 FEET
520 000 FEET
T. 13 N.
Wood River
UNION PACIFIC
40
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
¼
½
¾
1

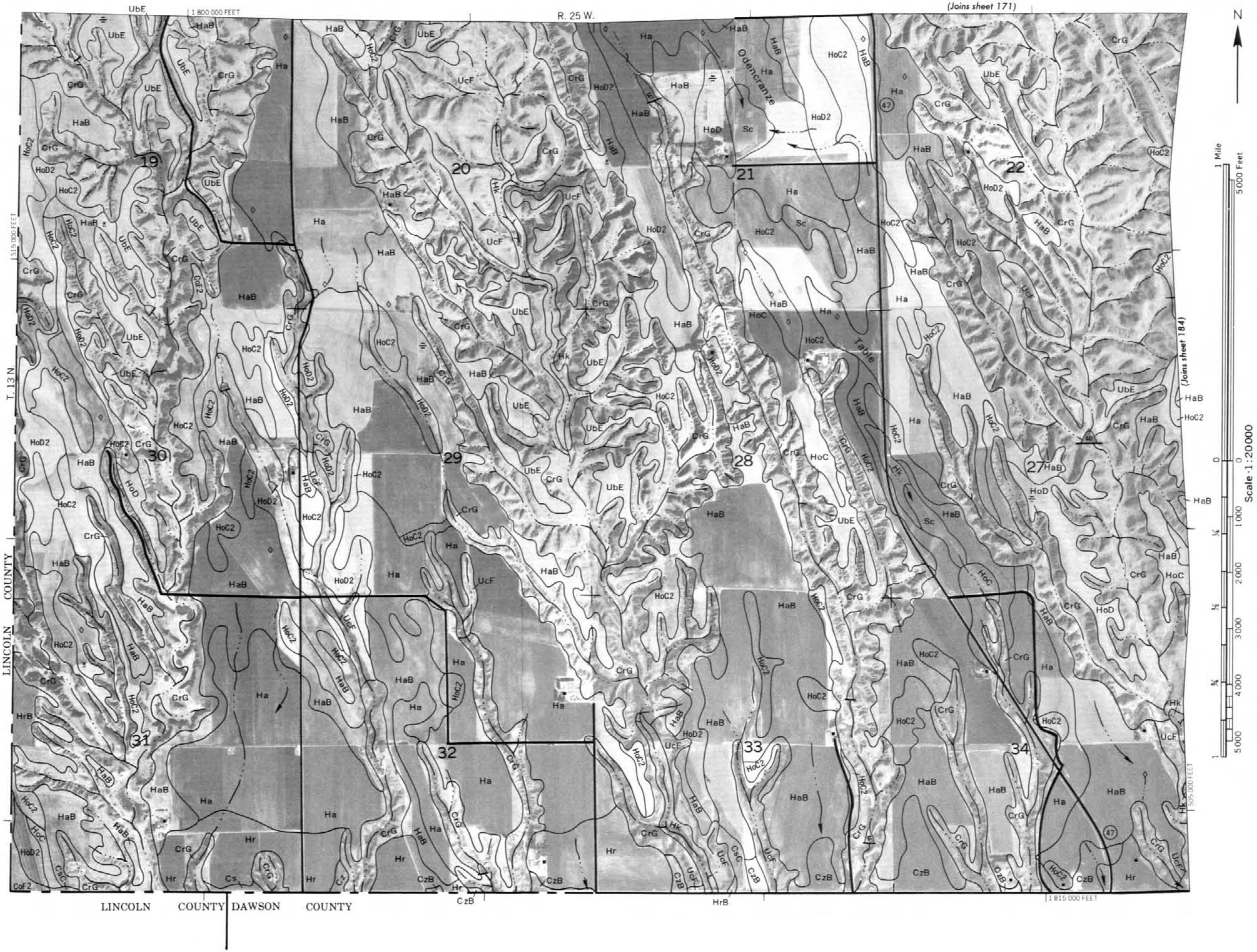
CUSTER COUNTY, NEBRASKA — SHEET NUMBER 178


179
N
R. 20 W. | R. 19 W.
1 985 000 FEET
(Joins sheet 167)
(Joins sheet 178)
(Joins sheet 180)
(Joins sheet 191)
2 005 000 FEET
T. 13 N.
SOUTH LOUP RIVER
Deer Creek
West Box Elder Creek
East Box Elder Creek
Box Elder Creek
Warm
Swamp
water
BOX ELDER CEMETERY
Cumro
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
1
3
4
5
6
7
8
9
10
12
13
15
16
17
18

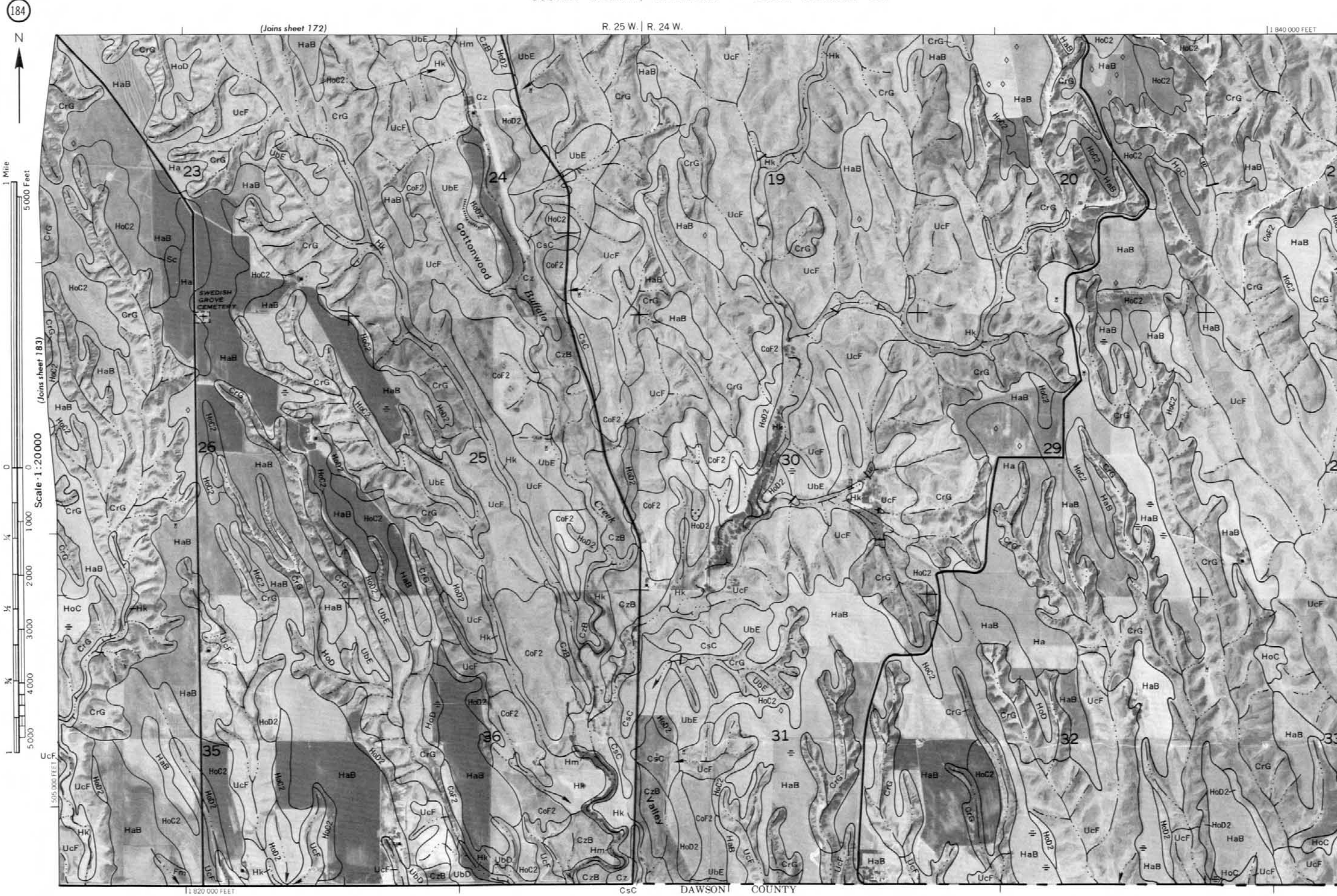

180
N
(Joins sheet 168)
R. 19 W. | R. 18 W.
2 030 000 FEET
530 000 FEET
T. 13 N.
(Joins sheet 179)
(Joins sheet 181)
(Joins sheet 192)
2 010 000 FEET
520 000 FEET
1 Mile
5000 Feet
Scale 1:20000
Flat
Creek
Bottom


181
N
R. 18 W.
R. 17 W.
(Joins sheet 169)
(Joins sheet 182)
(Joins sheet 193)
(Joins sheet 180)
T. 13 N.
2 035 000 FEET
2 050 000 FEET
530 000 FEET
520 000 FEET
ELK CREEK CEMETERY
Elk Creek
183
1 Mile
5000 Feet
Scale 1:20000

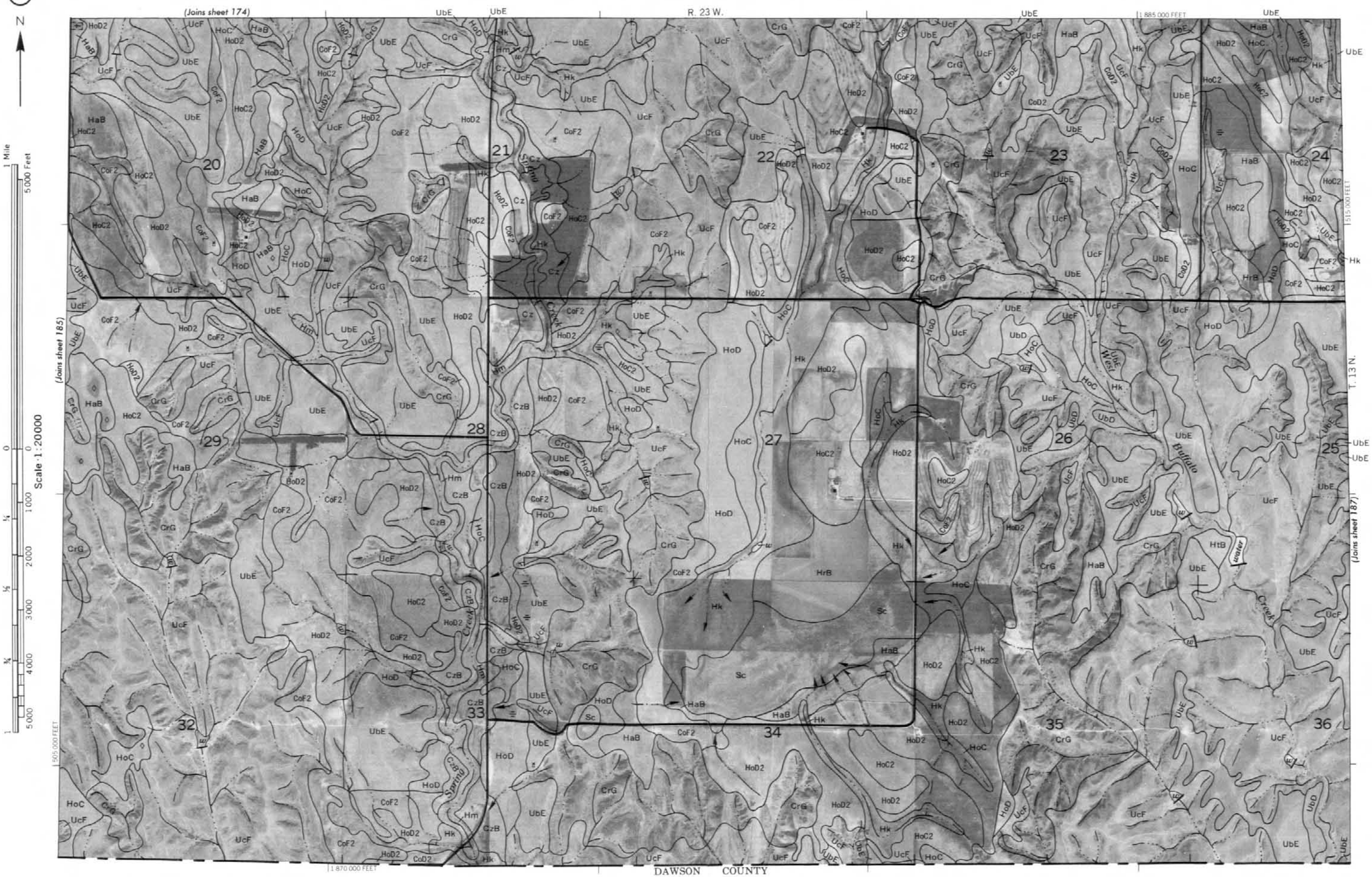

182
N
(Joins sheet 170)
R. 17 W.
2 075 000 FEET
(Joins sheet 181)
T. 13 N.
530 000 FEET
(Joins inset B, sheet 158)
520 000 FEET
2 055 000 FEET
(Joins sheet 194)
Stoddard
Creek
Black
Hill
Basin
Scale 1:20000
1 Mile
5000 Feet
0
1000
2000
3000
4000
5000
¼
½
¾
1

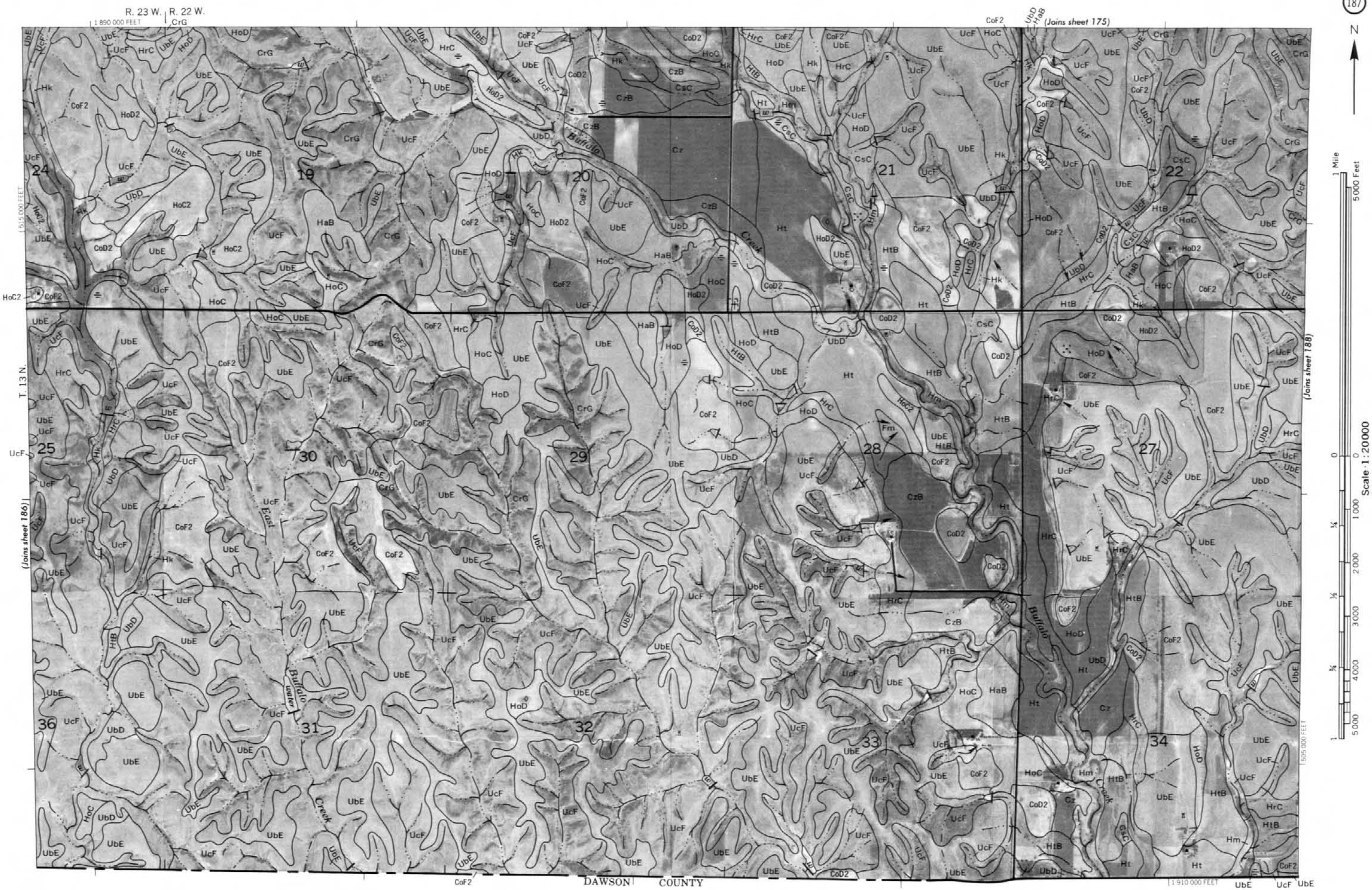


183
N
(Joins sheet 171)
(Joins sheet 184)
R. 25 W.
T. 13 N.
1 800 000 FEET
1 815 000 FEET
515 000 FEET
505 000 FEET
LINCOLN COUNTY
LINCOLN COUNTY
DAWSON COUNTY
Odencranze
Table
19
20
21
22
27
28
29
30
31
32
33
34
47
Scale 1:20000
1 Mile
5000 Feet
0
¼
½
¾
1
1000
2000
3000
4000
5000
UbE
CrG
HaB
Ha
UcF
HoC2
HoD2
HoD
HoC
Sc
Hk
Hr
HrB
CzB
Cz
Cs
CsC
CoF2

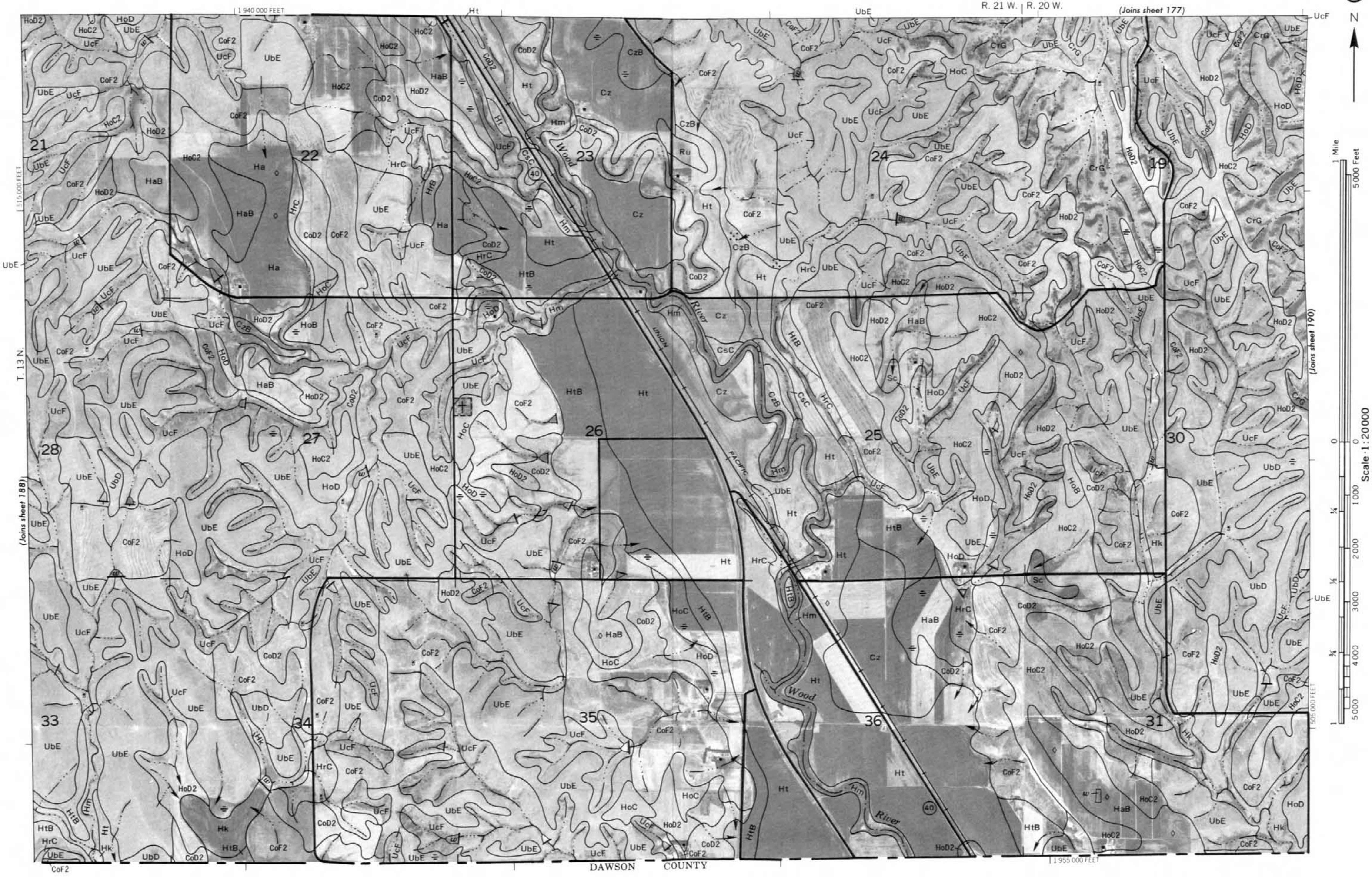

184
N
(Joins sheet 172)
R. 25 W. | R. 24 W.
1 840 000 FEET
(Joins sheet 183)
(Joins sheet 185)
T. 13 N.
515 000 FEET
505 000 FEET
1 820 000 FEET
Scale 1:20000
1 Mile
5000 Feet
SWEDISH GROVE CEMETERY
Cottonwood
Buffalo
Creek
Valley
DAWSON COUNTY
19
20
21
23
24
25
26
28
29
30
31
32
33
35
36

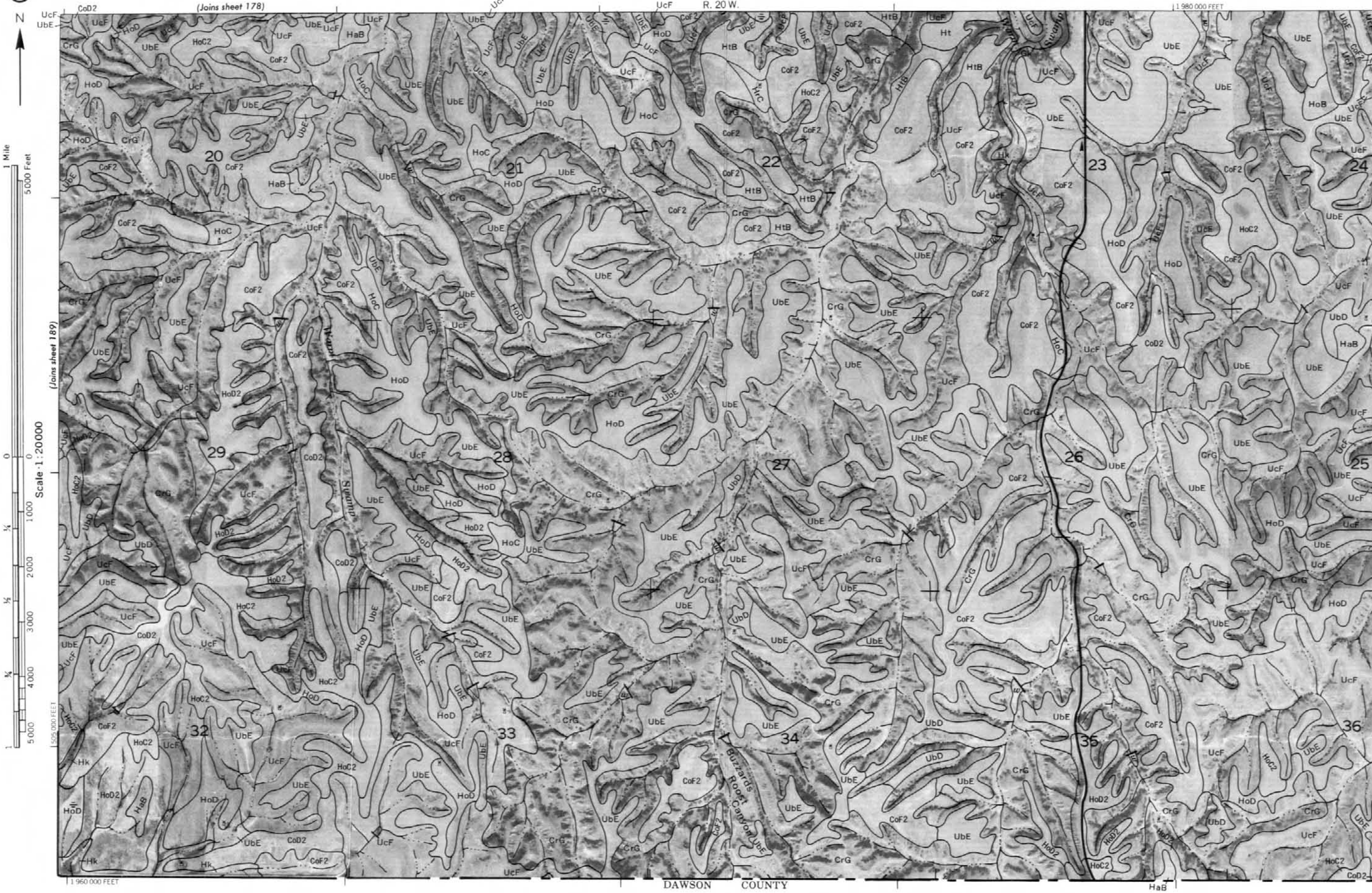

1 845 000 FEET
R. 24 W.
R. 23 W.
(Joins sheet 173)
N
515 000 FEET
T. 13 N.
(Joins sheet 184)
(Joins sheet 186)
505 000 FEET
1 865 000 FEET
Roten
Slump
Ditch
Valley
DAWSON
COUNTY
Scale 1:20000
1 Mile
5000 Feet
0
¼
½
¾
1
1000
2000
3000
4000
5000
21
22
23
24
19
28
27
26
25
30
33
34
35
36
31

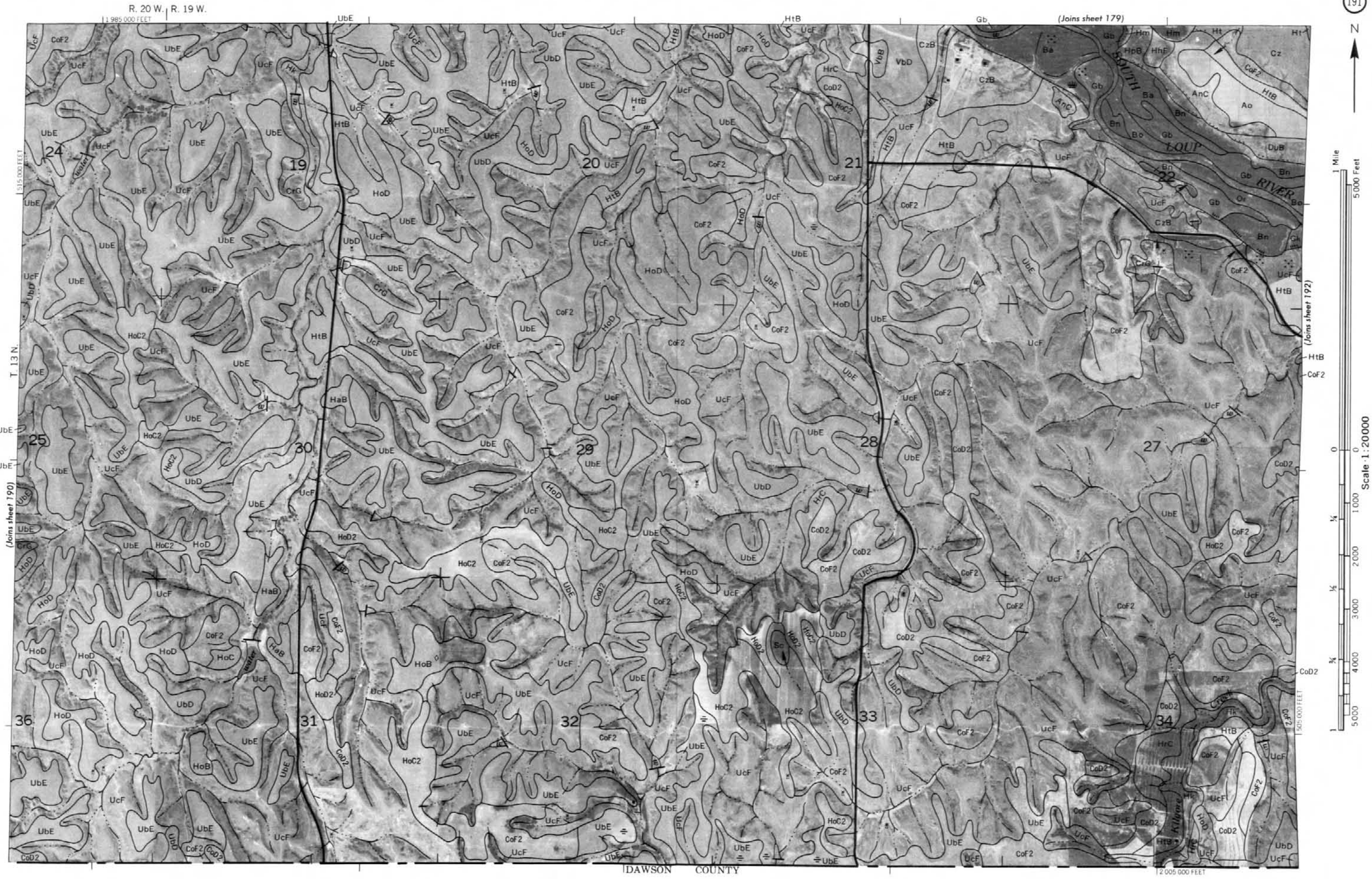

N
(Joins sheet 174)
R. 23 W.
1 885 000 FEET
(Joins sheet 185)
(Joins sheet 187)
T. 13 N.
515 000 FEET
505 000 FEET
1 870 000 FEET
DAWSON COUNTY
1 Mile
5000 Feet
Scale 1:20000
20
21
22
23
24
29
28
27
26
25
32
33
34
35
36
Spring Creek
West Buffalo Creek
water


187
R. 23 W.
R. 22 W.
1 890 000 FEET
(Joins sheet 175)
(Joins sheet 188)
(Joins sheet 186)
T. 13 N.
N
1 Mile
5000 Feet
Scale 1:20000
Buffalo
Creek
East
Buffalo
water
Creek
19
20
21
22
24
25
27
28
29
30
31
32
33
34
36
DAWSON
COUNTY
1 910 000 FEET
505 000 FEET
515 000 FEET

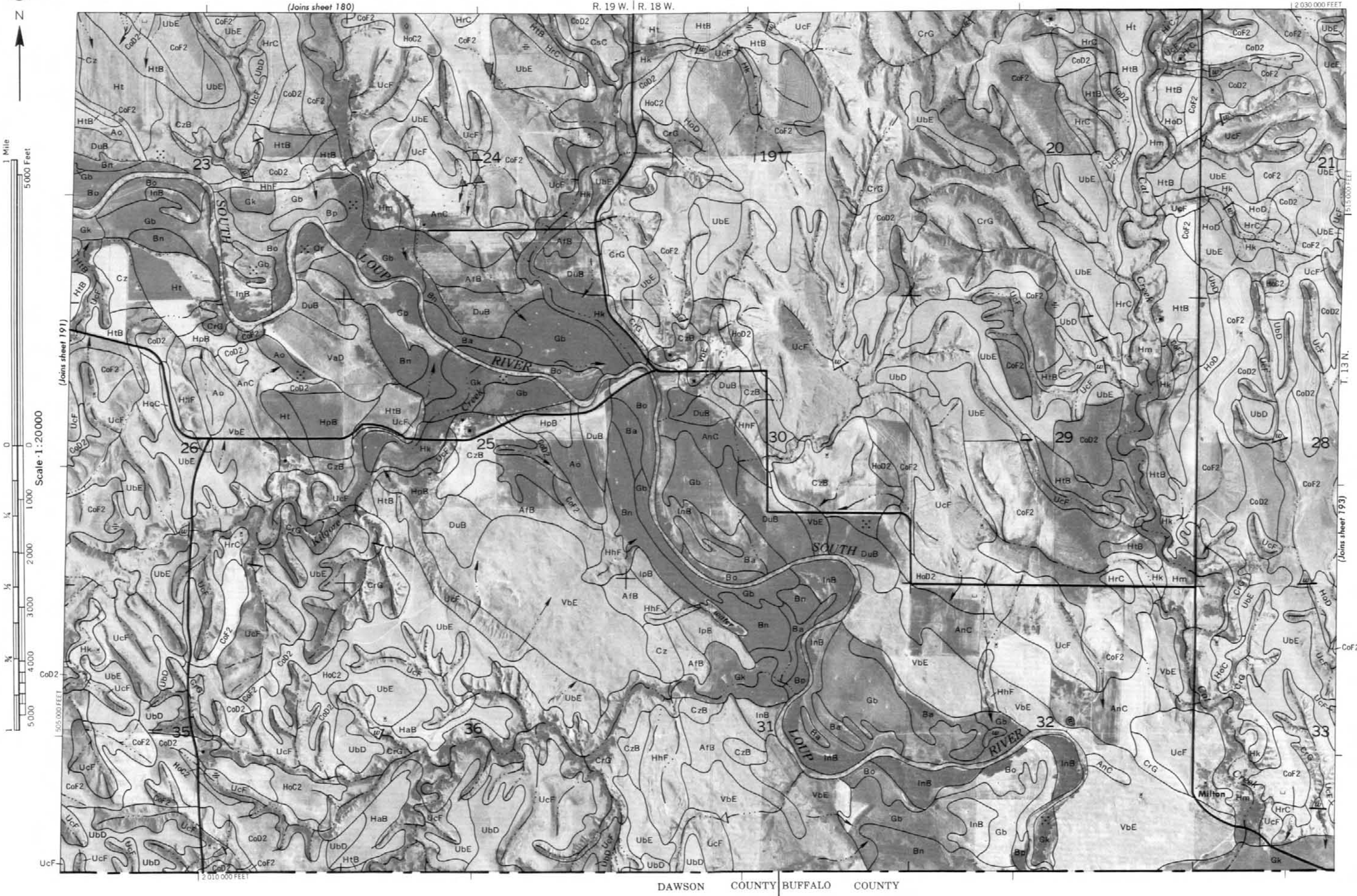

N
1 Mile
5 000 Feet
Scale 1:20000
(Joins sheet 176)
R. 22 W. | R. 21 W.
(Joins sheet 187)
(Joins sheet 189)
T. 13 N.
1 935 000 FEET
515 000 FEET
505 000 FEET
1 915 000 FEET
DAWSON COUNTY
23
24
19
20
21
26
25
30
29
28
35
36
31
32
33

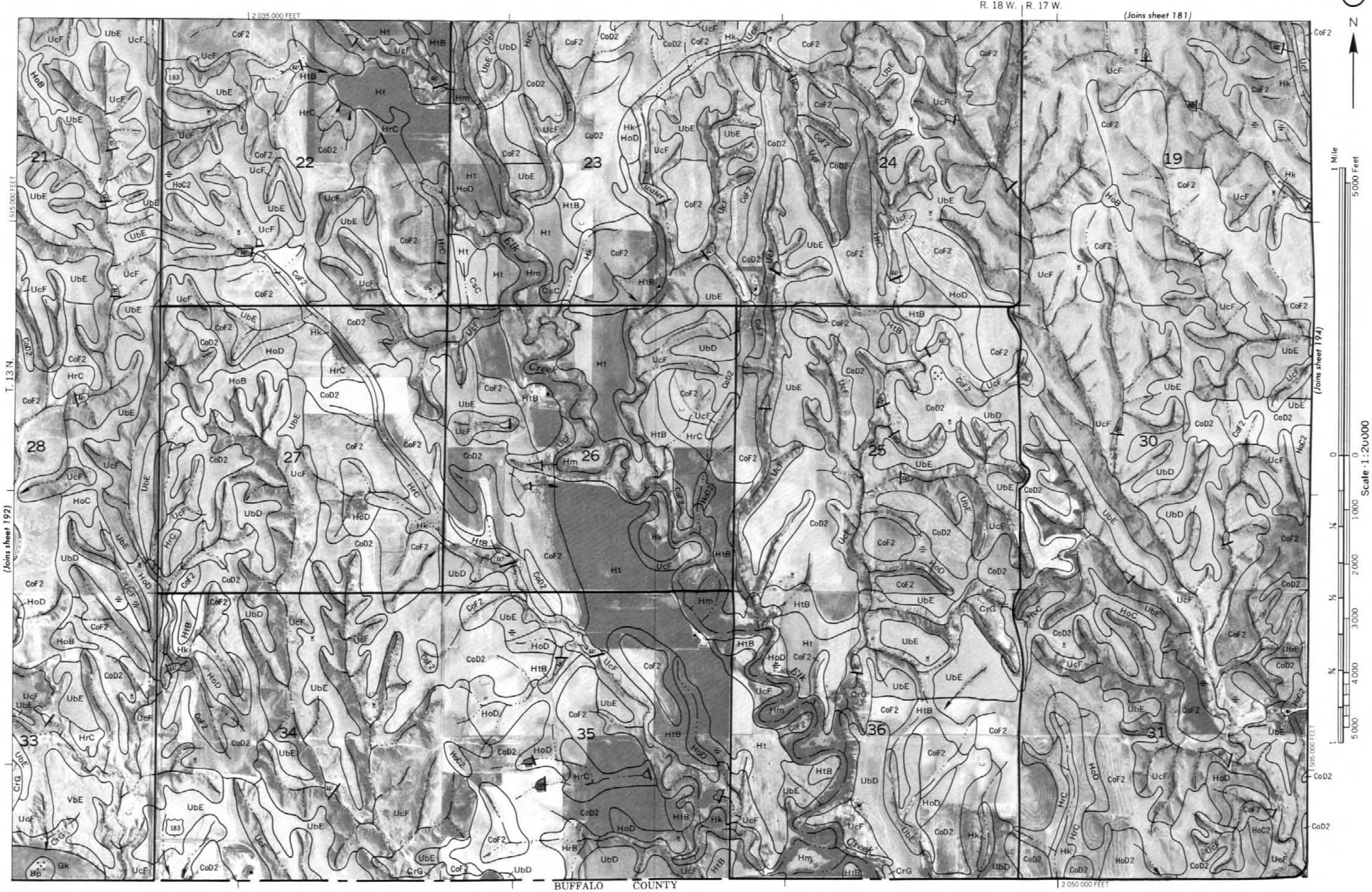

189
N
(Joins sheet 177)
(Joins sheet 190)
(Joins sheet 188)
R. 21 W.
R. 20 W.
T. 13 N.
1 940 000 FEET
1 955 000 FEET
515 000 FEET
505 000 FEET
Wood River
UNION PACIFIC
DAWSON COUNTY
Scale 1:20000
1 Mile
5000 Feet
21
22
23
24
19
28
27
26
25
30
33
34
35
36
31

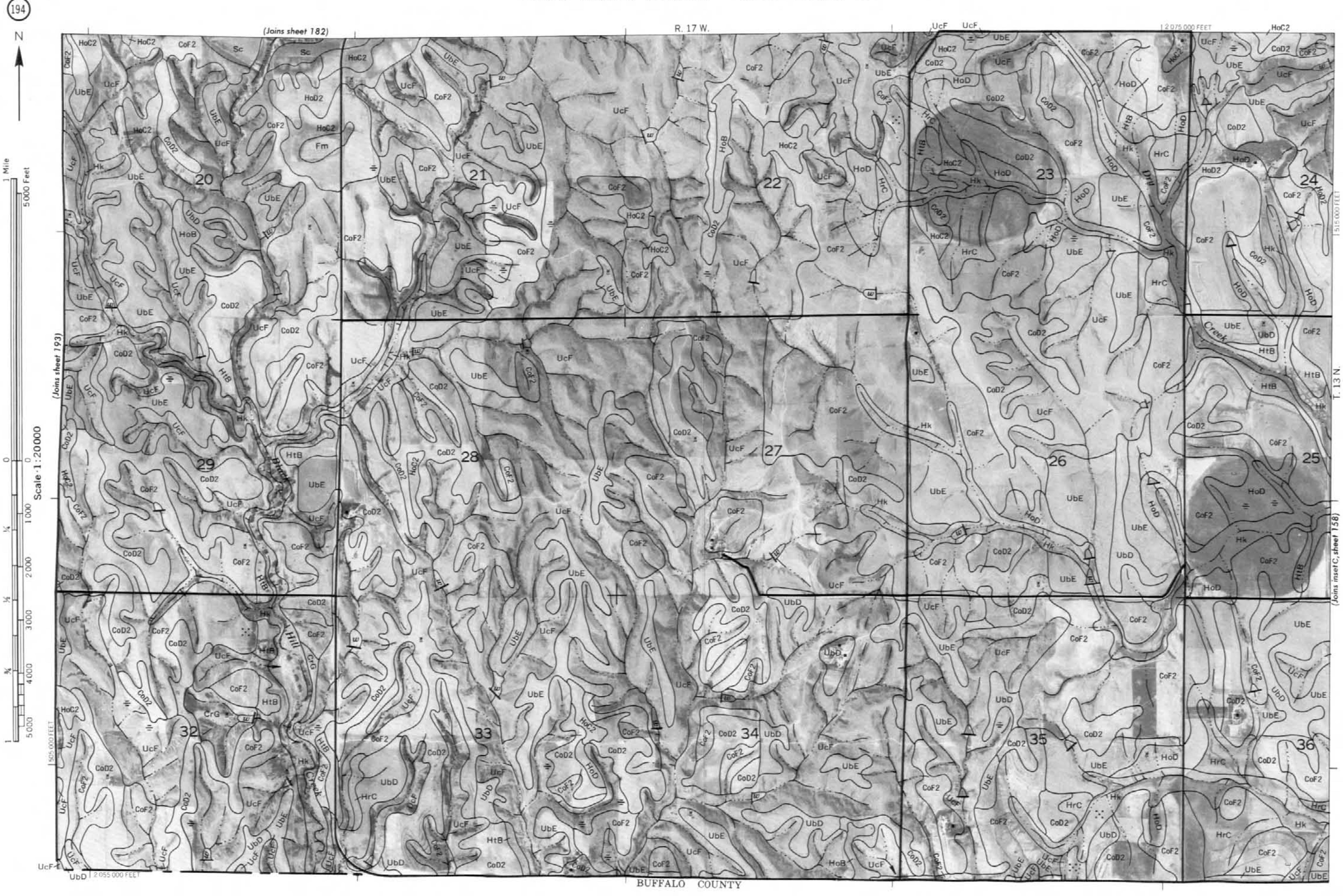

N
(Joins sheet 178)
R. 20 W.
1 980 000 FEET
(Joins sheet 189)
(Joins sheet 191)
T. 13 N.
515 000 FEET
505 000 FEET
1 960 000 FEET
Scale 1:20000
1 Mile
5000 Feet
20
21
22
23
24
25
26
27
28
29
32
33
34
35
36
Wand Swamp
Buzzards Roost Canyon
DAWSON COUNTY


191
R. 20 W. | R. 19 W.
1 985 000 FEET
515 000 FEET
505 000 FEET
2 005 000 FEET
(Joins sheet 179)
(Joins sheet 192)
(Joins sheet 190)
T. 13 N.
SOUTH LOUP RIVER
Kilgore Creek
DAWSON COUNTY
N
1 Mile
5000 Feet
Scale 1:20000
0 ¼ ½ ¾ 1
0 1000 2000 3000 4000 5000
19
20
21
22
24
25
27
28
29
30
31
32
33
34
36

CUSTER COUNTY, NEBRASKA — SHEET NUMBER 192




R. 18 W.
R. 17 W.
(Joins sheet 181)
(Joins sheet 192)
(Joins sheet 194)
T. 13 N.
2 035 000 FEET
515 000 FEET
505 000 FEET
2 050 000 FEET
N
1 Mile
5000 Feet
Scale 1:20000
BUFFALO COUNTY
Elk Creek
21
22
23
24
19
28
27
26
25
30
33
34
35
36
31
183


194
N
(Joins sheet 182)
R. 17 W.
2 075 000 FEET
(Joins sheet 193)
T. 13 N.
515 000 FEET
(Joins inset C, sheet 158)
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
505 000 FEET
2 055 000 FEET
BUFFALO COUNTY
20
21
22
23
24
25
26
27
28
29
32
33
34
35
36
Dry
Creek
Hill
Creek